AGM300 / ADM800 Ammonia Gas Monitoring System

Instruction 3015-4275
Installation / Operation / Maintenance

Rev. 3 – May 2006

Notice:

Product improvements and enhancements are continuous; therefore the specifications and information contained in this document may change without notice.

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Introduction

How to Use This Manual

Thank you for investing in a **BACHARACH** Ammonia Gas Monitoring System.

This manual provides important information on how to install, operate, and service the AGM300 Ammonia Gas Monitor and ADM800 Ammonia Display Module.

Please Read this Manual Carefully Before Use

If you have a working knowledge of gas monitors, you will find this manual useful as a reference tool. If you are new to the use of gas monitors, you can educate yourself about the principles of gas detection and the proper operation of this device by reading this manual thoroughly.

Safety Precautions

AC Power Supply

Ensure the source voltage matches the voltage of the product before energizing the equipment. It is highly suggested that the AGM300 be placed on a separate circuit (with UPS or surge protection).

- A switch or circuit-breaker shall be included in the building installation
- It shall be in close proximity to the equipment and within easy reach of the operator
- It shall be marked as the disconnecting device for the equipment

Protective Grounding

Under no circumstances should this equipment be operated without connection to a protective ground. Doing so poses a potential shock hazard and is also a violation of electrical safety standards applicable to this type of equipment.

Explosive Atmosphere

Do not operate this equipment in the presence of flammable liquids, vapors or aerosols. Operation of any electrical instrument in such an environment constitutes a safety hazard.

Proper Exhaust Venting

It is imperative that the exhaust port on this instrument be properly vented as described in this manual. Failure to do so constitutes a safety hazard.

Working Inside the Instrument

Extreme care should be exercised when accessing the interior of this instrument. Only qualified electrical maintenance personnel should perform connections and adjustments. Always de-energize the power supply before working inside the instrument.

Modifications to the Instrument

Under no circumstances should this instrument be modified without written consent from Bacharach, Inc. Changes or modifications to this instrument, not expressly approved, will void the warranty.

In Case of Malfunction

Do not continue to use this equipment if there are any symptoms of malfunction or failure. In the case of such occurrence, de-energize the power supply and contact a qualified repair technician or the nearest Bacharach Service Center. ONLY provided knockouts are to be used for electrical and communication wiring. Drilling into the box will void the warranty.

Fusing

AGM300, 120 VAC Input, Power Supply P/N 3015-3167

F1: 0.5 A, 250V Fast Acting, 5mm x 20mm, P/N 604-2538
F2: 250 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2537
F3: 5 A, 250V Fast Acting, 5mm x 20mm, P/N 604-2539
F4: 63 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2535

AGM300, 230 VAC Input, Power Supply P/N 3015-3161

F1: 250 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2537
F2: 125 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2536
F3: 5 A, 250V Fast Acting, 5mm x 20mm, P/N 604-2539
F4: 32 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2534

ADM800

F1 & F2: 1 A, 250VAC, Fast Acting, 5mm x 20mm, P/N 3015-4011

Safety Precautions (Cont.)

Installation Category

Installation Category II, Pollution Degree II, as defined by UL.

Altitude Limit

2,000 meters

Cleaning

USE a dry cloth to clean the outside of the case. **DO NOT** use soap and water**.**

Warning Statements

The use of the word **WARNING** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, or condition, or the like, which if not correctly performed or adhered to, could result in personal injury or death.

Caution Statements

The use of the word **CAUTION** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, condition, or the like, which if not correctly performed or adhered to, could result in damage to the equipment.

Hazard Symbols on Monitor

This symbol indicates the need to consult this operating instruction manual when opening the enclosure.

WARNING: A potential risk exists if the operating instructions are not followed.

This symbol indicates the presence of electric shock hazards when the enclosure is opened.

WARNING: To avoid risk of injury from electric shock, do not open the enclosure when power is applied.

Functional Overview

General Description

The AGM300 is designed to support compliance to federal, state and local safety codes governing ammonia gas emissions. Avoiding significant ammonia gas loss reduces equipment replacement costs, maintains equipment efficiency, promotes safety, and protects the environment.

The AGM300 provides for the continuous monitoring of ammonia gas levels in up to 16 separate test zones. Each zone can be independently programmed to identify leak (small), spill (medium), or evacuation (large) levels of gas. The instrument also retains a log of previous readings that can be easily accessed for analysis.

An audible alarm and large LED indicators are provided to signal alarm conditions, and relay contacts are provided for the connection of external alarm devices. The system also includes two 4–20 mA current loop interfaces (optional) for connection to external devices.

The AGM300 requires only minor periodic maintenance such as the occasional replacement of filters. The instrument incorporates active diagnostics that continuously monitor the system for proper operation. An LED indicator is provided to indicate system malfunctions, and fault codes are displayed that enable the operator to identify the source of the fault.

Communication Options

The AGM300 features full two-way communications via an RS-485 interface. MODBUS RTU is the communication protocol standard. The instrument can be connected directly to a Building Management System or it may be operated as a stand-alone system using the ADM800 Ammonia Display Module.

An RS-232C port is also provided for connection to a PC. This enables the AGM300 to be setup from a personal computer.

Please refer to the Appendix for a more complete discussion of communication protocols.

Suggested Location of Sampling Points

At the point of an ammonia gas leak the gas is nearly pure. As the gas is dispersed into the air, the gas molecules diffuse causing a dilution of the original concentration. The AGM300 measures the ammonia gas concentration at the precise point the sample is collected. Therefore, if the termination of the collection line is not at the exact point of the gas leak, then the unit will read a diluted mixture of the gas and air.

It should also be noted that when ammonia gas is cold it is heaver than air and settles below the leak point, but as the gas warms to room temperature it becomes lighter than air and tends to collect above the point of a leak. Consequently, sampling points should ideally be located as close as possible to the source of potential leaks. If this is impractical, then the alarm set points should be adjusted for that zone to compensate for the dilution of the gas. **DO NOT plug any of the zones**. Plugging a zone will give the monitor a false indication during start up.

The AGM300 should be centrally located in the mechanical room and be readily accessible for easy visual monitoring and servicing. Air sample tubing may be run in lengths up to **500 feet**. The fresh air purge line should draw from an area that does not contain any ammonia gas and cannot exceed **300 feet** in length. The exhaust line should run to an out side location if possible. The length of the exhaust line cannot exceed **300 feet**.

Ideally, two to three pick up points spaced around each chiller will provide sufficient coverage. It may be necessary to perform a "smoke" test of the mechanical room to determine the best locations. The smoke test would provide the pattern of air currents present in the mechanical room.

AGM300 / ADM800 Refrigerant Gas Leak Monitor Mechanical Room Placement

Exhaust Fan

Aux. Horn/Strobe Remote Alarm

Fresh air purge from area away from ammonia gas

Outside Hallway

ADM800

Ammonia Display Module outside of mechanical room

Sample Inlet Pickup Point

Machine Room

Chiller

AGM300

Ammonia Gas Monitor

Sample Inlet Pickup Points

The ADM800 should be mounted outside of the mechanical room or at least just inside of a door to the room. This is the "split architecture design" for safety of the operator. The ADM800 can be located up to 4500 feet from the AGM300. The ADM800 is the main interface by which you program the AGM300, acknowledge alarms, and observe conditions inside of the mechanical room. Note that there are two additional alarm relay contacts in the ADM800 that can be programmed to alarm with "leak, spill, evacuate, fault or monitor on".

AGM300 Installation

STANDARD ACCESSORIES FOR A 4 POINT SYSTEM
5 Line-End Filters (P/N 3015-3420)
AGM300/ADM800 Instruction Manual (P/N 3015-4275)

AGM300 - Installation Considerations

Locating the Monitor

The AGM300 should be centrally located in the facility and should be easily accessible for visual monitoring and servicing. Intake sample lines can be up to 500 feet in length, but it is important to remember that sampling cycle time is proportional to the total number and length of individual sample lines.

Dirt, grease, and oils can adversely affect the operation of the AGM300. The monitor should be installed out of direct sunlight in a clean, dry area that is not subject to temperature or humidity extremes. Installation of the monitor in a mechanical room is acceptable provided reasonable environmental conditions exist. If there is a question, consider installing the unit outside of the mechanical room in a cleaner area of the facility.

Warnings and Cautions

WARNING – **Drilling holes in the AGM300 and ADM800 enclosure will void the warranty**. Please use knockouts provided for electrical connections.

WARNING - Do not operate this equipment in the presence of flammable liquids, vapors or aerosols. Operation of any electrical instrument in such an environment constitutes a safety hazard.

WARNING - Always de-energize the power supply before working inside the instrument.

CAUTION - The AGM300 contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.

Inspection

The AGM300 has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the monitor be re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Open the door latches and inspect the interior of the instrument for loose components that may have become dislodged during shipment. If damage is discovered, please contact the nearest Bacharach Service Center for assistance.

AGM300 - Mounting Instructions

Screw Locations

The AGM300 should be installed plumb and level and securely fastened to a rigid mounting surface. The enclosure utilizes keyhole mounting brackets designed for #12 pan head fasteners. Locate the four screws as shown in the diagram and leave the screw heads protruding approximately 3/16".

AGM300 Mounting Specs
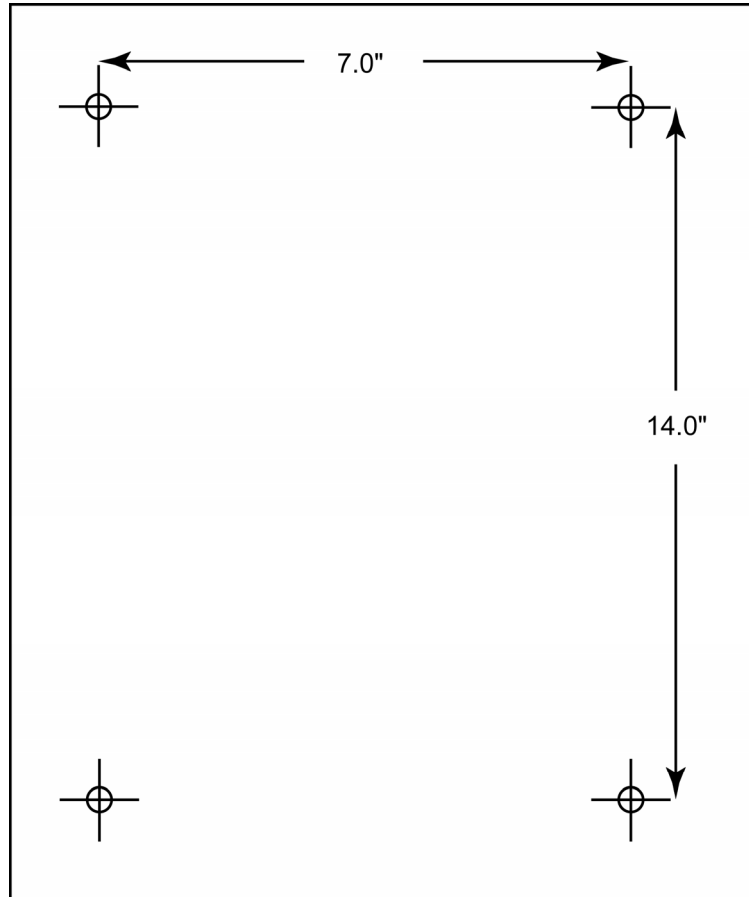
Installation

Hold the monitor flat against the mounting surface and allow it to slide down engaging the screw heads in the keyhole slots of the mounting brackets. Adjust the screws as necessary to hold the monitor securely against the mounting surface.

AGM300 - Connecting Air Lines

Overview

Individual sample lines are run from the AGM300 to each area of the facility to be monitored. Additionally, a purge line is installed to provide clean air for resetting the infrared zero baseline. An exhaust line is installed to vent residual gas away from the monitor. All sample line connections are made on the left side of the enclosure as indicated in the photograph below.
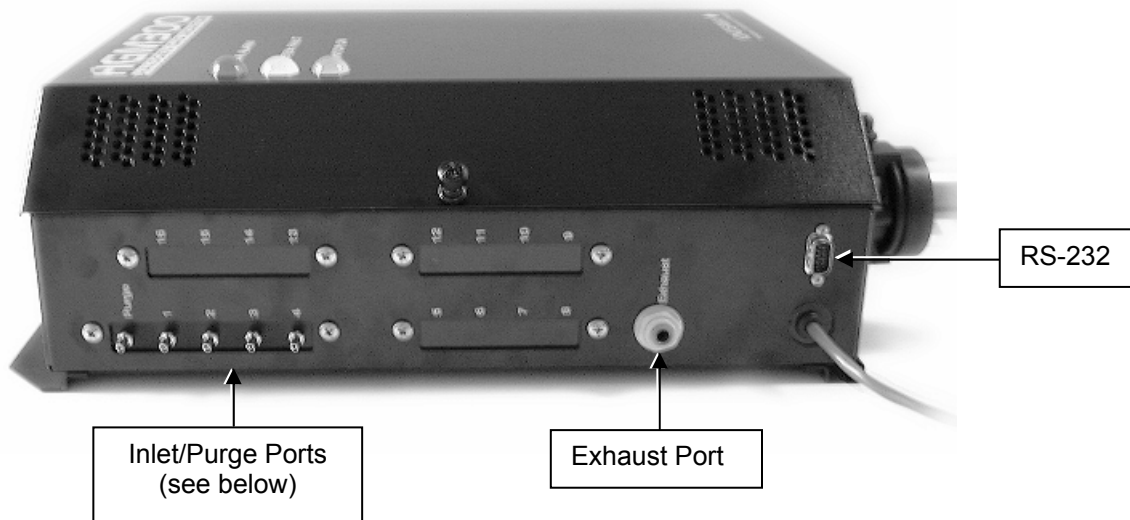
AGM300 Side View

Intake Ports

Exhaust Port

Purge Port

RS-232 Connector

RS-232

Inlet/Purge Ports
(see below)

Exhaust Port

Inlet / Purge Ports

Tubing Considerations

Use ¼" outside diameter (0.040" wall) flex tubing is used for all air lines (P/N 304-2742). The tubing should be clean and free of residual moisture or other contaminants. The tubing should be cut cleanly with a sharp knife and care should be taken not to distort the tubing end.

IMPORTANT: Due to the reactive nature of ammonia gas, it is important to use materials that will not absorb ammonia gas as it passes though the sampling system. The use of unauthorized tubing or any other materials in the gas sampling stream may lead to erroneously low readings.

To connect the air lines to the monitor simply push the tubing firmly onto the connector. All tubing bends should have a radius of no less than 5" to assure proper airflow. If kinks or obstructions occur in any of the air lines the instrument may not function properly.

Connecting Purge Line

A purge line is required to draw fresh air into the instrument and should not exceed 300 feet in length. It is advisable to terminate the line outdoors, provided the input is not exposed to rain, snow, ice, exhaust fumes, or other airborne contaminates. If an outdoor installation is impractical, the line should be run to an area inside the facility that you are certain is not contaminated with ambient ammonia gas. A line-end filter (P/N 3015-3420) should be attached to the end of the purge line.

Connecting Exhaust Line

An exhaust line is required to vent gas samples away from the instrument and should not exceed 300 feet in length. The exhaust line should terminate in a location that is completely isolated from the purge line termination point and other areas of the facility that will be monitored. Ideally this line should terminate outdoors in a location that is not exposed to the elements. This line does not require a line-end filter. If the exhaust line terminates outside the building, position the tubing so that no water or moisture can enter it.

Connecting Sample Intake Lines

The AGM300 is designed to accommodate up to 16 separate sample intake lines. The standard configuration of the unit includes one manifold of 4 intake connectors and 1 purge connector. Additional manifolds can be easily installed to increase monitoring capacity (field installation kit part P/N 3015-3419, and 4 zone line end filter kit P/N 3015-3411).

Sample intake lines can be up to 500 feet in length. All line terminations should be positioned to reduce the possibility of mists, aerosols, oil, water, dust, or other contaminates being drawn into the instrument. A line-end filter (P/N 3015-3420) should be attached to the end of each sample intake line.

IMPORTANT: DO NOT plug any of the zones. Plugging a zone will give the monitor a false indication during start up.

Please refer to the earlier Section *Suggested Location of Sampling Points* to learn more about where to place the ends of the sample intake lines.

Water Trap

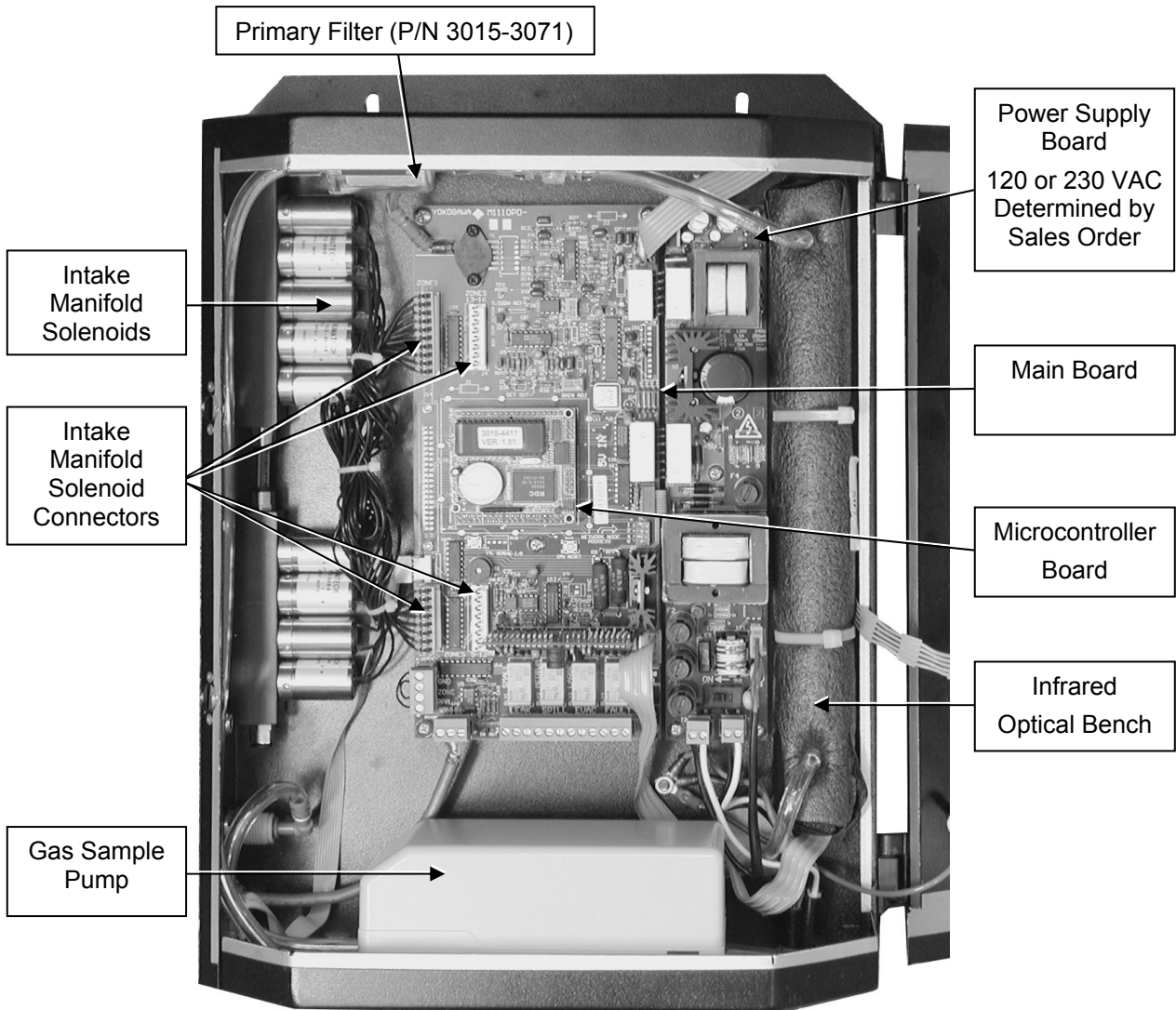A water trap has been installed as a standard feature. The water trap prevents condensation or moisture from entering the infrared device and causing serious damage. To empty the water trap, loosen the wing nut and allow water to drain – be sure to **retighten** the wing nut.

CAUTION - The introduction of contaminants through the air intake lines can result in serious and permanent damage to the monitor.

AGM300 - Interior Schematic

Primary Filter

Intake Manifold Solenoids

Intake Solenoid Connectors

Power Supply Board

Main Board

Microcontroller Board

Infrared Optical Bench

Gas Sample Pump

Primary Filter (P/N 3015-3071)

Power Supply Board

120 or 230 VAC Determined by Sales Order

Intake Manifold Solenoids

Main Board

Intake Manifold Solenoid Connectors

Microcontroller Board

Infrared Optical Bench

Gas Sample Pump

AC Power / RS-485 / Relay Connector / 4-20 mAdc Current Loop

4–20 mAdc
Interface Board
(Optional)

Dual 4-20 mAdc
Outputs
(Signal Out Only)
DO NOT APPLY
POWER!

RS-485
Connector

Relay Connector
Alarm 1, 2, 3, Fault

Ground Stud

Auxiliary AC Out Connector T2
(Used to Supply AC power to Alarm Devices)
(Overload Protected by Fuse F3)

AC Power
ON/OFF
Switch

AC IN
Connector
T1

Location of
AC Input
Line Filter
(230 VAC
Units Only)

Switches / Fuses

F4

F2

F1

AGM300
Fuses
(Refer to
Maintenance
Section for
values Page 64)

F3
Connects to Aux. AC Out
Connector T2
5 Amp 250VAC
(P/N 604-2539)

AC Power
ON/OFF
Switch

Factory
Default

Terminator
IN / OUT

CPU
Reset

Node Address
Switches

AGM300 - Electrical Wiring

It is highly recommended that the AGM300 be connected directly to the AC power source, preferably on its own circuit. The connection should be completed with a UL rated multi-conductor wire (14-18 AWG).

Locate service knockouts on exterior of enclosure and install electrical conduit in the typical manner.

The AGM300 is available in either a 120 or 230 VAC configuration. The unit's AC voltage rating is marked on the outside of the enclosure. Do one of the following to connect the AC power leads and ground:

• 120 VAC Installation

Locate the AC IN connector T1 and the Ground Stud on the inside of the enclosure (Page 7).

Remove the AC IN connector from the Power Supply board, and then secure the incoming AC power line (black) and neutral (white) wires to this connector as shown in the following illustration. Carefully plug the connector back onto the circuit board.

Using the supplied crimp-on ring terminal, washers, and nuts, connect the AC input ground wire (green) along with the ground wire connected to the enclosure's lid to the monitor's Ground Stud.

• 230 VAC Installation

Locate the AC Input Line Filter's black and white wires, and the Ground Stud on the inside of the enclosure (Page 7).

Using wire nuts, secure the incoming AC power Line 1 (black) and Line 2 (white) wires to the AC Input Line Filter as shown in the following illustration.

Using the supplied crimp-on ring terminal, washers, and nuts, connect the AC input ground wire (green) along with the ground wire connected to the enclosure's lid to the monitor's Ground Stud.

WARNING – Drilling holes in the AGM300 enclosure will void the warranty. Please use knockouts provided for electrical connections.
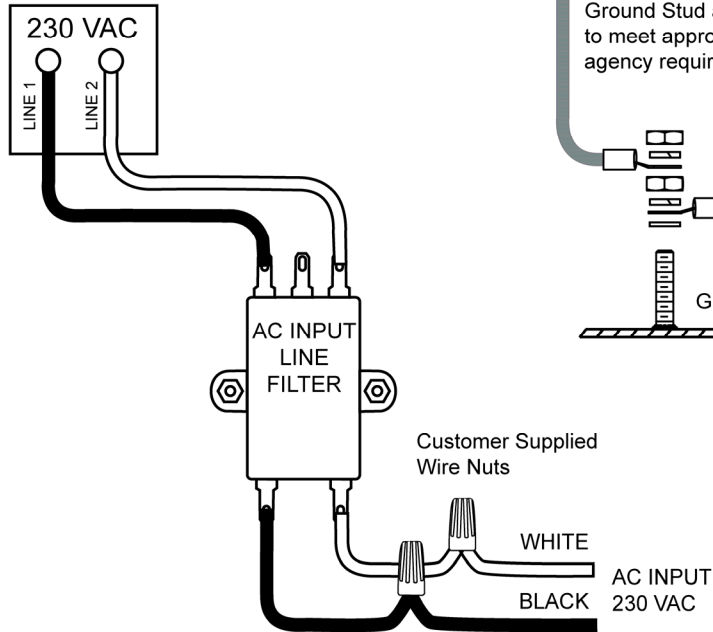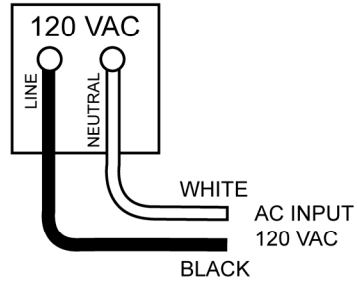
WARNING - Electrical installation should be performed by a certified electrician and should comply with all applicable local, state, and federal electrical safety codes.

WARNING - Under no circumstances should this instrument be operated without connection to a protective ground. Doing so poses a potential shock hazard and is also a violation of electrical safety standards applicable to this type of equipment.

- A switch or circuit-breaker shall be included in the building installation
- It shall be in close proximity to the equipment and within easy reach of the operator
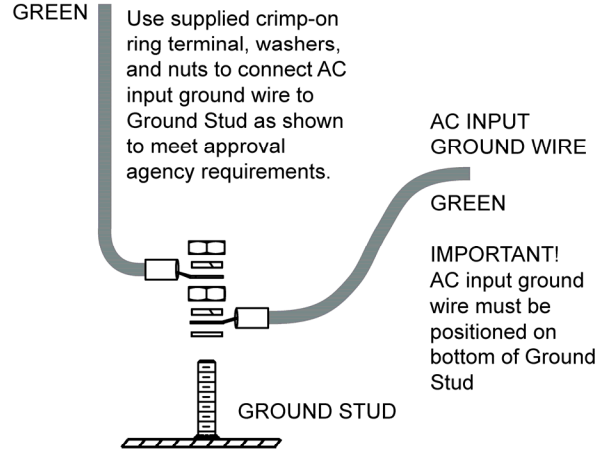- It shall be marked as the disconnecting device for the equipment

AGM300 AC Input Power and Ground Connections

**AC IN Connector T1
on Power Supply Board**

120 VAC

LINE

NEUTRAL

WHITE

AC INPUT
120 VAC

BLACK

230 VAC

LINE 1

LINE 2

Ground Stud Wiring Detail

GROUND WIRE
TO ENCLOSURE DOOR

GREEN

Use supplied crimp-on
ring terminal, washers,
and nuts to connect AC
input ground wire to
Ground Stud as shown
to meet approval
agency requirements.

AC INPUT
GROUND WIRE

GREEN

IMPORTANT!
AC input ground
wire must be
positioned on
bottom of Ground
Stud

GROUND STUD

AC INPUT
LINE
FILTER

Customer Supplied
Wire Nuts

WHITE

AC INPUT
BLACK   230 VAC

AGM300 - Connecting Communication Devices

Ammonia Display Module (ADM800) Connection

The AGM300 is connected to the ADM800 using a shielded twisted pair instrument cable. The maximum distance between the farthest away AGM300 and ADM800 is 4500 feet.

Use any of the remaining service knockouts to gain access to the interior of the monitor. The RS-485 communication wiring between the AGM300 and ADM800 must be connected in the following manner:

> Locate the RS-485 connector in the AGM300 (Page 7). Connect one lead of a twisted shielded pair to the "B" connection point (the far left point), note the wire color. Connect the second wire to the "A" connection point (the middle), note the wire color. Connect the ground to the "GND" connection point

> Locate the RS-485 connector marked "TO MONITORS" in the ADM800 (Page 23). This connector is located on the far-left bottom of the ADM800 PC board. Make the wire run to the ADM800 and connect the twisted shielded pair to the RS-485 TO MONITORS connector using the same color code as used on the AGM300.

## Integrating with Building Management Systems

The AGM300 may be connected directly to a Building Management System using a shielded twisted pair cable. The cable from the Building Management System is connected to the RS-485 connector inside the AGM300. MODBUS RTU is the standard communication protocol.

Use any of the remaining service knockouts to gain access to the interior of the monitor. Locate the RS-485 connector and remove it from the circuit board. Secure the wire leads to the connector orienting them as shown in the diagram below. Check to make sure that the polarity matches the wiring to the Building Management System. When you are through securing the connections, carefully plug the connector back onto the circuit board.

Larger Integrated Systems

You may also connect the AGM300 to a Building Management System through an ADM800. In this case, first connect the AGM300 to the ADM800 as described above. Then, follow the instructions under the heading *ADM800 – Communications Connections* on Page 26 for information on how to connect the ADM800 to a Building Management System.

RS-485 Connector

RS-485

LEAD B   LEAD A   GROUND
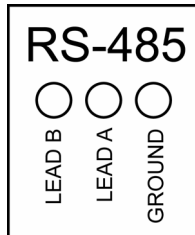
Changing Terminator Settings

The terminator switch is shipped from the factory in the terminated or "IN" position. This is the correct setting if the AGM300 is connected as a single device, or it is the last device on the network chain. If the AGM300 is being installed in the middle of a network, the terminator must be moved to the "OUT" position.

Locate the switch and determine its position. If it needs to be moved, slide the switch to the appropriate position.
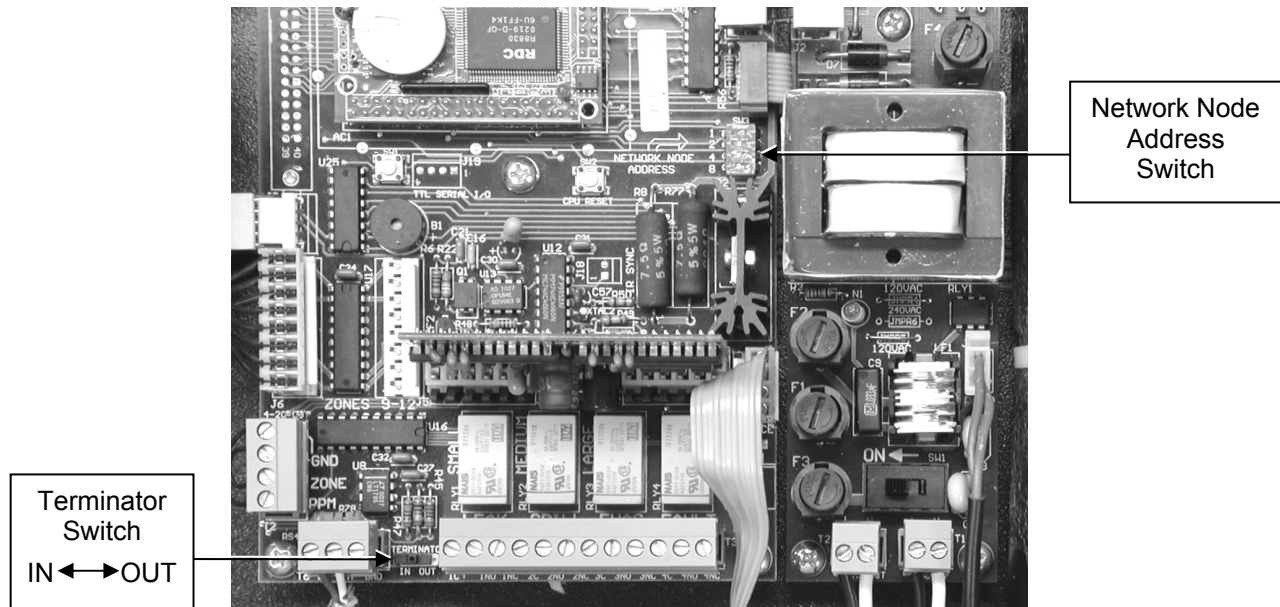
Node Address DIP Switch Settings
(Refer to Multiple AGM's and Connecting to a Building Management System)

Each AGM300 on the network must have a distinct node address. The node address may be set from 1 to 15. Four dip switches numbered 1, 2, 4, 8 on the main circuit board are used to define this value by setting the correct combination of dip switches to their ON positions. The node address is the sum of the switch numbers that are ON.

Example: - For node address "5" switches 1 and 4 are ON.

- For node address "13" switches 1, 4, & 8 are ON.
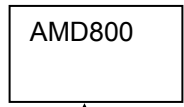
Power must be cycled to elect this change.

Personal Computer
(Refer to AGM300 PC Software Section)

The AGM300 may be connected to a personal computer using the RS-232 interface on the left side of the enclosure.
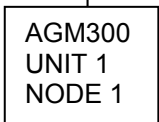
Software will be provided upon request or as a download from:
http://www.bacharach-inc.com/downloads.htm.

Multiple AGM's

TERMINATOR
"IN"

MULTIPLE AGM300'S WITH ADM800

NOTE 1: The last AGM300 or ADM800 on either end of the network must have its terminator in the "IN" position, and all other units must have their terminators in the "OUT" position.

NOTE 2: The total length of the RS-485 cable cannot exceed 4500 feet. (Use instrument cable 20 gage multi-strand shielded and twisted pair – similar or equal to Belden cable #8762.)

AMD800

RS-485 CONNECTIONS BETWEEN AGM300's

NOTE: The terminators in the ADM800 and AGM300 Unit 4 must be in the "IN" position. The terminators in AGM300 Units 1, 2 & 3 must be in the "OUT" position.

RS-485

AGM300 UNIT 1 NODE 1	AGM300 UNIT 2 NODE 2	AGM300 UNIT 3 NODE 3	AGM300 UNIT 4 NODE 4
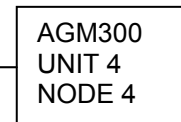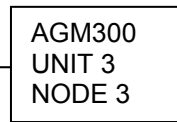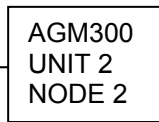
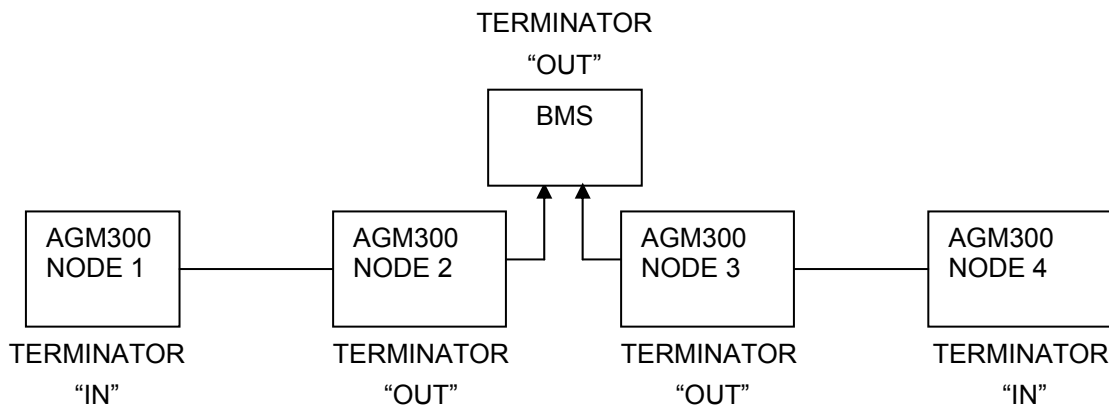TERMINATOR "OUT"   TERMINATOR "OUT"   TERMINATOR "OUT"   TERMINATOR "IN"

Connecting to a Building Management System

The AGM300 may be connected to a Building Management System via the RS-485 connector. The node address switch on each AGM300 may be set from "1" to "15" in order to identify itself to the Building Management System. Note that Building Management Systems set to a "0" or "1" address both respond to messages from the ADM800 as address "1" therefore you should not have a unit set to "0" and another set to "1" on the same network.

If the AGM300 network is connected directly to a Building Management System it **may not** be connected to the ADM800. However, the ADM800 has two communication ports, an "upstream" port (labeled TO HOST) and a "downstream port (labeled TO MONITORS). A BMS node may be connected to the up stream ADM800 port while the downstream ADM800 port talks to the AGM300's. In this case, the BMS is talking "through" the ADM800 to the AGM300's, but not physically on the AGM300/ADM800 network.

NOTE: If the AGM300 is not at the end of the line in a series connection, then the terminator on the AGM must be set to "OUT." Also, each end of the series must have the terminator set to "IN".

MULTIPLE AGM300'S CONNECTED TO A BUILDING MANAGEMENT SYSTEM

TERMINATOR
"OUT"

BMS

AGM300 NODE 1	AGM300 NODE 2	AGM300 NODE 3	AGM300 NODE 4

TERMINATOR "IN"   TERMINATOR "OUT"   TERMINATOR "OUT"   TERMINATOR "IN"

MULTIPLE AGM300's CONNECTED TO A BUILDING MANAGEMENT SYSTEM
DAISY CHAIN FASHION

```
                    ┌─────────────┐
                    │  BUILDING   │
        RS-485      │ MANAGEMENT  │
                    │   SYSTEM    │
                    └─────────────┘
                      TERMINATOR
                         "IN"

┌──────────┐   ┌──────────┐   ┌──────────┐   ┌──────────┐
│ AGM300   │◄──│ AGM300   │◄──│ AGM300   │◄──│ AGM300   │
│ UNIT 1   │   │ UNIT 2   │   │ UNIT 3   │   │ UNIT 4   │
│ NODE 1   │   │ NODE 2   │   │ NODE 3   │   │ NODE 4   │
└──────────┘   └──────────┘   └──────────┘   └──────────┘
 TERMINATOR     TERMINATOR     TERMINATOR     TERMINATOR
   "OUT"          "OUT"          "OUT"          "IN"
```
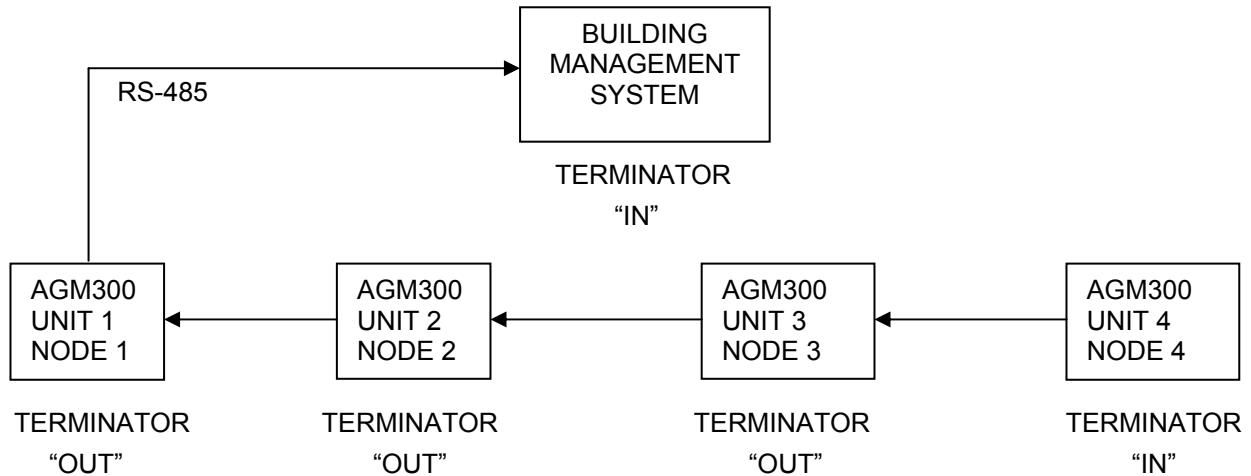
AGM300 - PC Software

Programming the AGM300 Using PC Software

NOTE 1: There are two versions of PC software. Use Version 1.0 with AGM300 units with v1.0 Unit Firmware, which were built June 2001 or before (as indicated by a serial number that starts with AF01 or lower). Use Version 1.52 or higher with v1.21 Unit Firmware or above, which were built August 2001 or later (as indicated by a serial number that starts with AH01 or above). The Firmware version is indicated on the label on the ROM module inside the AGM300.

NOTE 2: The PC software uses COM1 by default. Therefore, the interface cable should be connected to the port configured as COM1 on the PC. Also, no other software drivers or devices in the PC may control COM1 when the AGM300 software is in use.

The connection is made through a standard "straight through" serial port connection. A three-wire connection is used (RXD, TXD, and GND). No hardware flow control is used. The AGM300 software automatically configures COM1 to match the AGM300 RS-232 communications parameters.

NOTE 3: Occasionally the laptop connection will not connect properly and only two beeps are heard and the program times out. The cure for this is to disconnect the RS-232 cable and cycle power on both the AGM300 and the laptop. After both the AGM300 and the laptop are up and running connect the RS-232 cable and start the software program.

1. Turn on power to AGM300 and allow it to warm up.
2. Connect RS-232 interface cable to PC and RS-232 port on the AGM300.
3. Insert software disk into PC.
4. Open the AGM300 software using Windows Explorer.
5. Upon start up, the program will immediately attempt to download data from the AGM300. Several beeps can be heard as the program communicates with the AGM300.

    NOTE: To move through the screen use the **ARROW** keys to move up, down, left and right.

6. Use the **ENTER** key to select options and the **ESC** key to back out of a selection.

7. Using the arrow keys go to EDIT; press **ENTER** – the EDIT Menu DROPS DOWN; select SYSTEM and then press **ENTER** – the AGM LOCATION becomes highlighted. Press **ENTER** to move to the AGM TAG area; use the **BACKSPACE** key to remove the existing tag; then enter in a new tag. Press **ENTER** to return to LOCATION. Use the **ARROW** key to select the next item to be addressed. Note that you cannot change the "SN" or "FIRMWARE" items. Press the **ESC** key to return to the menu bar.

8. Go to EDIT; press **ENTER**; select ZONES; and then press **ENTER**. You may now select a specific zone to identify and set parameters. When REFRIGERANT is selected use the **ARROW** keys to move up and down through the gas library to locate the gas type for that zone. Highlight the gas type and press **ENTER**.

9. To set the ALARMS first select EVAC LEVEL; press **ENTER**; use the **BACKSPACE** key to clear previous setting; and type in the new PPM level. Use the same method to set the SPILL LEVEL and LEAK LEVEL.

10. To close or bypass a zone, set the DISTANCE to 0 feet.

IMPORTANT: Any time you modify a parameter (zone, system or calibration) and send it to the AGM300, please wait for the PC software to indicate that the download is complete before continuing with any edits.

Saving the AGM300 Program to a Disk or Drive

Go to FILE, PATH, and change the drive letter to the drive where the program is to be saved. Give the program a name, such as A:\AGM300 or C:\MY DOCUMENTS\AGM300; press **ENTER**; go to SAVE SETUP and press **ENTER** again. Type in the file name, such as "CHRM1" (eight characters maximum without a filename extension) and then press **ENTER**. The program will automatically add ".cfg" to the filename that you typed.

To Open a Saved Program

Open software; go to FILE, PATH, and clear the old path and type in the proper drive for the saved program (A: or C: etc.). Press **ENTER**; select the proper program; press **ENTER** again. The saved program will be downloaded into the software.

To Send a Saved Program to an AGM300

Open the AGM300 PC software; open the proper saved program; connect the PC to the AGM300; and then go to AGM, SEND SETUP and press **ENTER**. The saved program will be sent to the AGM300.

Trend Data

Creating a trend data file must be done while connected to the AGM300.

Go to FILE, PATH, clear the old path and type in the proper drive where the trend data will be saved. Press **ESC**; go to AGM; select GET TREND DATA; select the zone that you want to trend and press **ENTER**. The trend data will appear in a list format. Press **ENTER** again – a file name screen will appear. Type in the file name for that zone (trend1 etc.). Press **ENTER** and the file is saved as a text file. The text file can be converted to a Microsoft Excel file or printed as is.

NOTE: The TREND file must be saved ZONE by ZONE, with a filename per zone. The file will be saved in a notepad format, which can be converted to a delimited Excel file.

To Convert the TREND Text File to a Microsoft Excel File

Open Microsoft Excel; open the desired file using All files (*.*); select DELIMITED format and SPACE as the delimiter. Select GENERAL as the column data format. The text file now appears as an Excel file. To save the file, go to FILE, SAVE AS; select the proper drive; then change the file name extension to ".XLS" and save it. Comments or notes may be added to this file as needed and saved.

To Save and Print the AGM300 Software Screen, Alarm Log, Fault Log, or Diagnostic Screen

Open the software while connected to the AGM300. After the software gets the program, open the desired screen. With that screen as the active screen, press the **ALT** and **PRINT SCREEN** keys on the PC keyboard. Open Microsoft Word; go to FILE, NEW; go to EDIT; then PASTE. The active screen is then brought into Word. To save the file, select SAVE AS; select the proper drive and file name; and then press SAVE.

USB Type Laptops

Some of the newer laptops have USB ports and no RS-232 9-pin ports. You will be required to purchase a PCMCIA card that provides an RS-232 output. We recommend the PCMCIA card manufactured by:

SEALEVEL SYSTEMS, INC.
155 TECHNOLOGY PLACE
P. O. BOX 830
LIBERTY, SC 29657
PHONE – 864-843-4343
www.sealevel.com

Part number: PC- SIO-232 PCMCIA CARD

A " straight through" RS-232 cable and a DB25 to DB9 adapter will be required to connect the laptop to the AGM300.

AGM300 - Current Loop Interfaces

Optional 4–20 mAdc Outputs

Upon installation of the optional 4–20 mAdc Interface Board (Page 7) (P/N 3015-3133), the AGM300 has the capability of providing dual 4-20 mAdc scrolling current loop outputs for connection to external monitoring devices.

The interfaces are set up as follows:

Loop 1 indicates zone area

Loop 2 indicates PPM

Connection

The external devices are connected to the AGM300 using a shielded dual twisted pair cable. Use any of the remaining service knockouts to gain access to the interior of the monitor. Locate the Dual 4–20 mAdc Output connector (Page 7) and remove it from the circuit board. Secure the wire leads to the connector orienting them as shown in the diagram below. Check to make sure the polarity matches the wiring at the external device. When you are through securing the connections, carefully plug the connector back onto the circuit board.

NOTE: When one or both current loop outputs are not used, install a jumper wire between the ground the unused loop terminal(s) to prevent the system from generating a current loop fault.

CAUTION - The loop outputs have isolated grounds. Therefore, the cable shield should be terminated at the receiver and **not** at the AGM300. The signal for both current loops must be returned to the AGM300.

Current Loop Connector
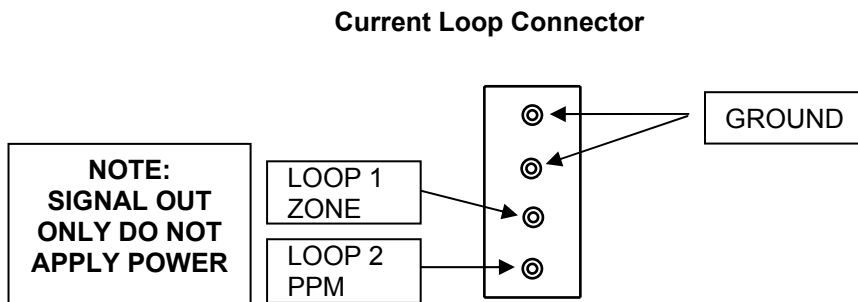
NOTE: The ground connections are common.

LOOP 1 = ZONE	LOOP 2 = PPM
5 mAdc = Zone 1	Default
6 mAdc – Zone 2	0.016 mAdc = 1 PPM
---	Scalable via Software
---	4 mAdc = 0 PPM
20 mAdc = Zone 16	20 mAdc = 1000 PPM

AGM300 - Connecting External Alarms

Overview

The AGM300 includes 4 Form C SPDT alarm contacts for the connection of external alarm devices. The relays are factory assigned to the following conditions:

Relay #1	Leak
Relay #2	Spill
Relay #3	Evacuate
Relay #4	Fault

Connection

Use the AC conduit or any of the remaining service knockouts to gain cable access to the interior of the monitor. Locate the relay connector (Page 7) and remove it from the circuit board. Secure the leads to the connector orienting them as shown in the diagram below. When you are through securing the connections, carefully plug the connector back onto the circuit board.
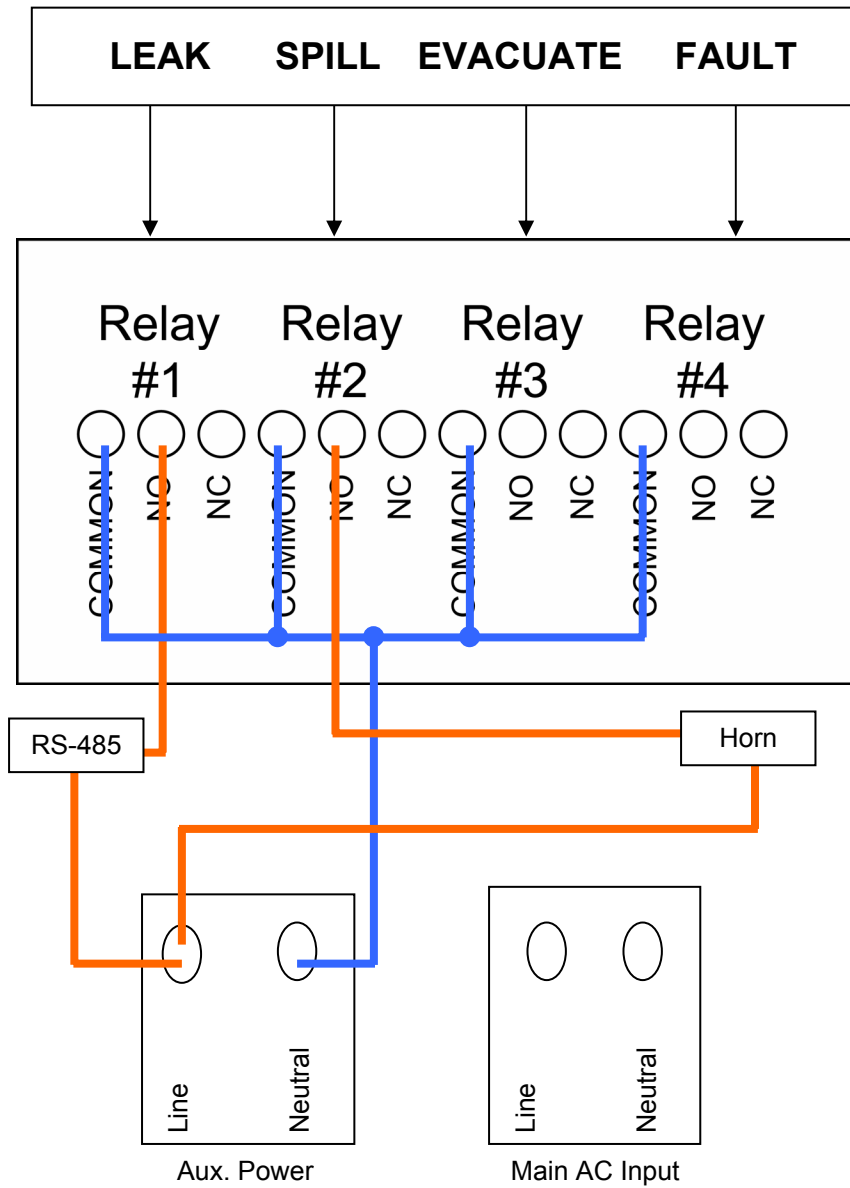
AGM300 Relay Connector
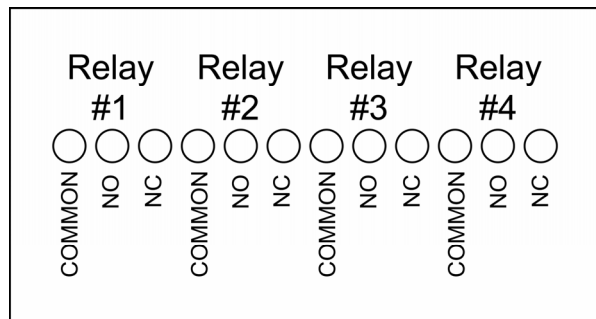
NOTE: Each relay may be connected as normally open (NO), or normally closed (NC).

Latching / Non-Latching – refer to Page 38 to select Alarm Ack Mode.

Alarm power source – power for the alarm devices connected to the relay contacts may be supplied from the Auxiliary AC Power Out Connector, 5 amp. max. (Page 7).

Typical AGM300 Relay 1 and Relay 2 Wiring
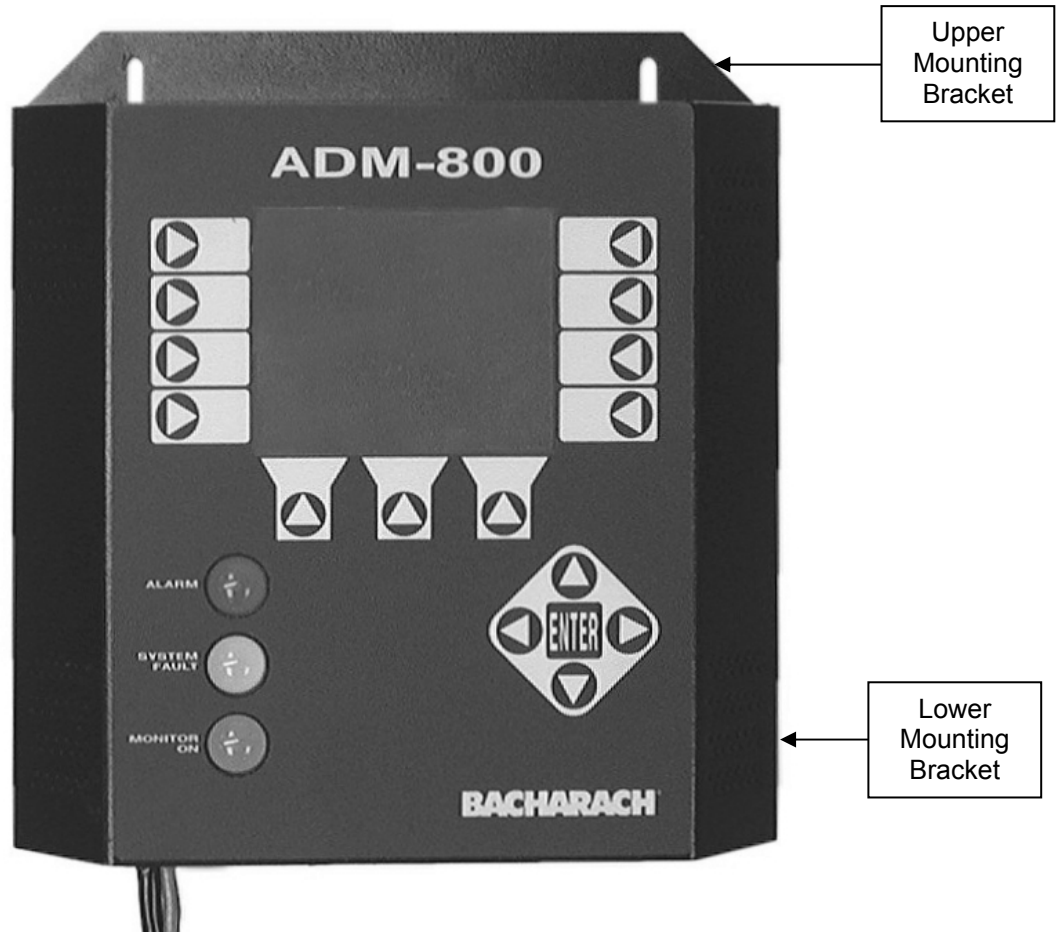

Jumper the 'Neutral' of the auxiliary power connector to the 'Common' on the relay block.

Connect one end of strobe or horn to the 'NO' of whichever level of alarm is appropriate for application.

The other end of strobe or horn is connected to the 'Line' of the auxiliary power connector (5 A max.).

ADM800 Installation

ADM800 Oblique Photo
Upper & Lower Mounting Brackets

ADM800 - Installation Considerations

Overview

Up to four AGM300 monitors may be connected to a single ADM800 display module. The ADM800 can be located anywhere up to 4500 feet from the furthest AGM300. The display module should be installed out of direct sunlight in a clean area that is not subject to temperature or humidity extremes.

Warnings and Cautions

WARNING - **Drilling holes in the AGM300 and ADM800 enclosure will void the warranty.** Please use knockouts provided for electrical connections.

WARNING - Do not operate this equipment in the presence of flammable liquids, vapors or aerosols. Operation of any electrical instrument in such an environment constitutes a safety hazard.

WARNING - Electrical installation should be performed by a certified electrician and should comply with all applicable local, state, and federal electrical safety codes.

WARNING - Always de-energize the power supply before working on the interior of the instrument.

CAUTION - The ADM800 contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.

Inspection

The ADM800 has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the instrument be re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Loosen the four screws on the sides of the enclosure and remove the front panel. Visually inspect the interior of the display for loose components that may have become dislodged during shipment. If damage is discovered, please contact the nearest Bacharach Service Center for assistance.

ADM800 - Mounting Instructions

Screw Locations

The ADM800 should be installed plumb and level and securely fastened to a rigid mounting surface. The enclosure utilizes keyhole mounting brackets designed for #12 pan head fasteners. Locate the four screws as shown in the diagram and leave the screw heads protruding approximately 3/16".

ADM800 Mounting Specs
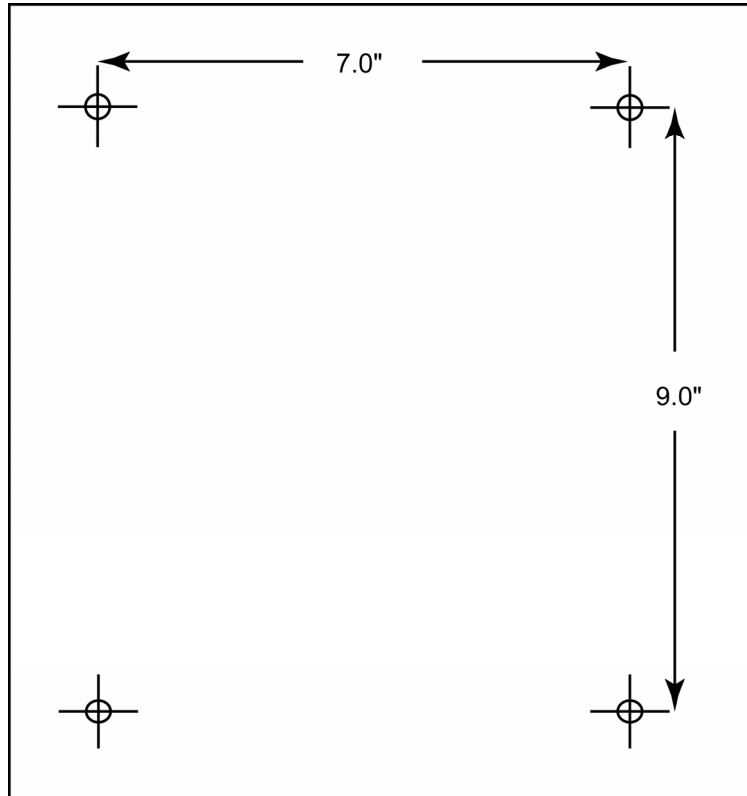
Installation

Hold the display module flat against the mounting surface and allow it to slide down engaging the screw heads in the keyhole slots of the mounting brackets. Adjust the screws as necessary to hold the unit securely against the mounting surface.

ADM800 - Interior Schematic

Microcontroller Board

CPU Reset Switch

Main Board

Ground Stud

AC Power

Microcontroller Board

CPU Reset Switch

Power Supply Board
120–230 VAC Input

Main Board

AC IN Connector T3

GROUND STUD

AC INPUT LINE FILTER (230 VAC Units Only)
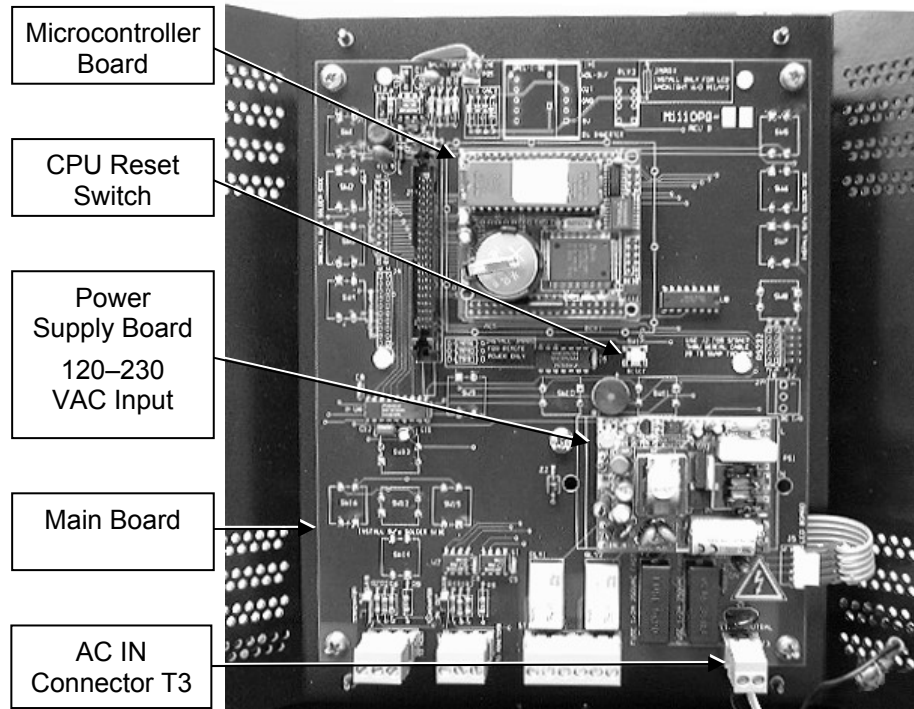
Front Panel
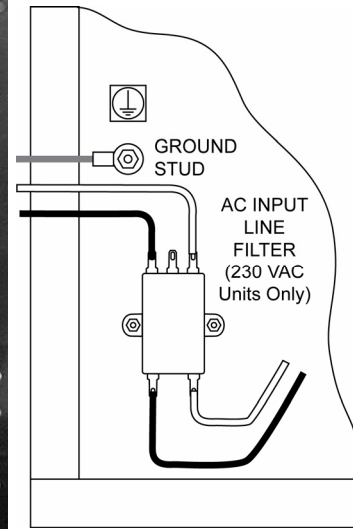
Chassis

AC Power

RS-485 Connectors

Terminator Switches

Relay Connector

Fuses

1 Amp
250 VAC
P/N
3015-4011

F2

F1

Terminator
Switches

TO MONITORS
RS-485 to
HGM300
Monitors

TO HOST
RS-485 to
Building
Management
System

Relay
Connector

AC IN
Connector T3
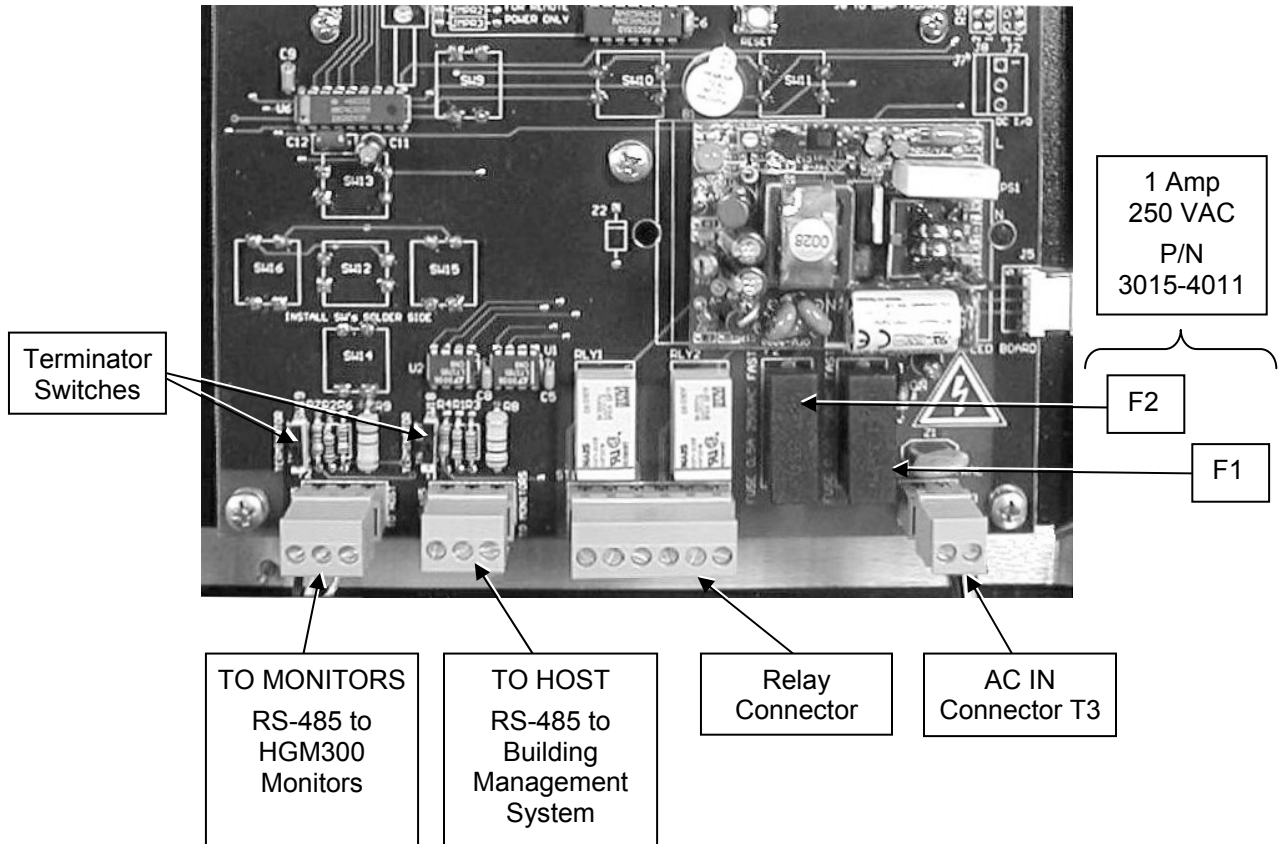
ADM800 - Electrical Wiring

It is highly recommended that the ADM800 be connected directly to the AC power source, preferably on its own circuit. The connection should be completed with a UL rated multi-conductor wire (14-18 AWG).

Locate service knockouts on exterior of enclosure and install electrical conduit in the typical manner.

The ADM800 is available in either a 120 or 230 VAC configuration. The unit's AC voltage rating is marked on the outside of the enclosure. Do one of the following to connect the AC power leads and ground:

• 120 VAC Installation

Locate AC IN connector T3 and the Ground Stud on the inside of the enclosure (Page 22).

Remove the AC IN connector from the circuit board, and then secure the incoming AC power line (black) and neutral (white) wires to this connector as shown in the following illustration. Carefully plug the connector back onto the circuit board.

Using the supplied crimp-on ring terminal, washers, and nuts, connect the AC input ground wire (green) along with the ground wire connected to the front panel to the unit's Ground Stud.

• 230 VAC Installation

Locate the AC Input Line Filter's black and white wires, and the Ground Stud on the inside of the chassis (Page 22).

Using wire nuts, secure the incoming AC power Line 1 (black) and Line 2 (white) wires to the AC Input Line Filter as shown in the following illustration.

Using the supplied crimp-on ring terminal, washers, and nuts, connect the AC input ground wire (green) along with the ground wire connected to the front panel to the unit's Ground Stud.

WARNING - Electrical installation should be performed by a certified electrician and should comply with all applicable local, state, and federal electrical safety codes.

WARNING - Under no circumstances should this instrument be operated without connection to a protective ground. Doing so poses a potential shock hazard and is also a violation of electrical safety standards applicable to this type of equipment.

- A switch or circuit-breaker shall be included in the building installation
- It shall be in close proximity to the equipment and within easy reach of the operator
- It shall be marked as the disconnecting device for the equipment

ADM800 AC Input Power and Ground Connections

AC IN Connector T3
on Main Board

120 VAC

LINE

NEUTRAL

Ground Wire
from
Front Panel

GROUND
STUD

BLACK

WHITE

GREEN
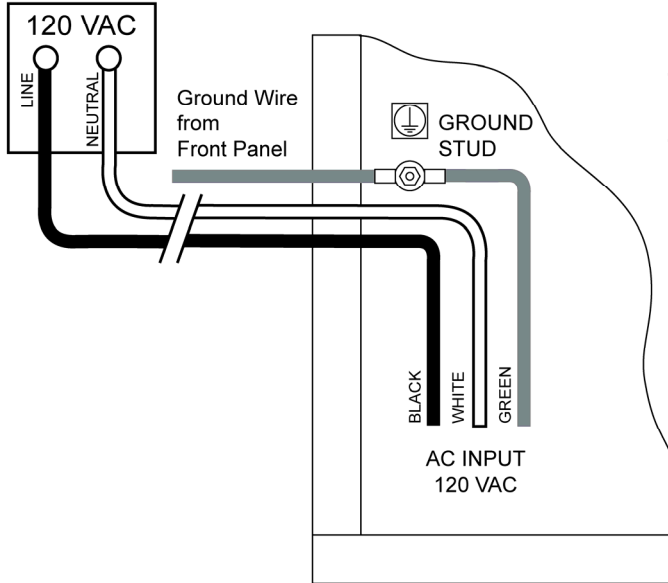
AC INPUT
120 VAC

Ground Stud Wiring Detail

GROUND WIRE
FROM FRONT PANEL

GREEN

Use supplied crimp-on
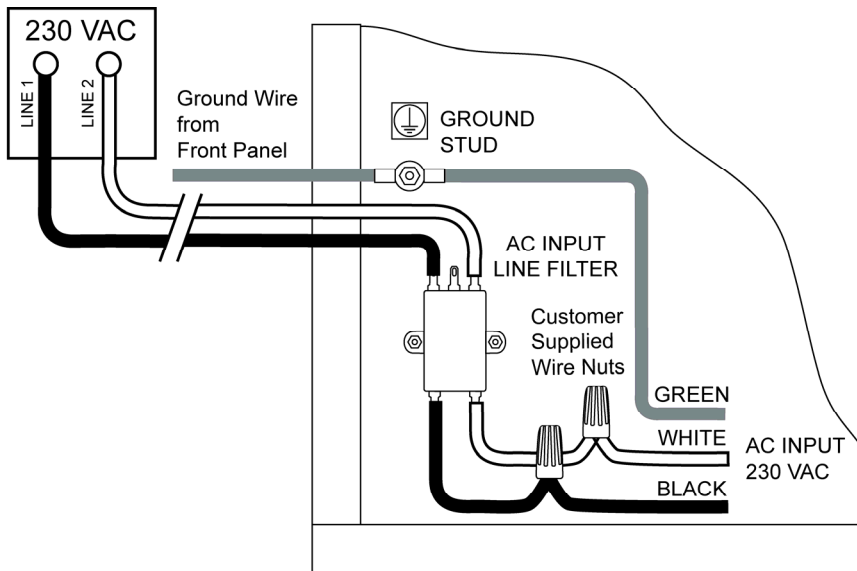ring terminal, washers,
and nuts to connect AC
input ground wire to
Ground Stud as shown
to meet approval
agency requirements.

AC INPUT
GROUND WIRE

GREEN

IMPORTANT!
AC input ground
wire must be
positioned on
bottom of Ground
Stud

GROUND STUD

230 VAC

LINE 1

LINE 2

Ground Wire
from
Front Panel

GROUND
STUD

AC INPUT
LINE FILTER

Customer
Supplied
Wire Nuts

GREEN

WHITE

BLACK

AC INPUT
230 VAC

ADM800 - Communication Connections

AGM300 Network

The ADM800 Ammonia Display Module is connected to the AGM300 network using a shielded twisted pair cable. The maximum distance between the ADM800 and the farthest AGM300 is 4500 feet.

Use any of the remaining service knockouts to gain access to the interior of the ADM800. The RS-485 communication wiring between the ADM800 and AGM300 must be connected in the following manner:

Locate the RS-485 connector marked "TO MONITORS" in the ADM800 (Page 23). This connector is located on the far-left bottom of the ADM800 circuit board. Connect one lead of a twisted shielded pair to the "B" connection point (the far left point), note the wire color. Connect the second wire to the "A" connection point (the middle), note the wire color. Connect the ground to the "GND" connection point.

Make the wire run to the AGM300 and connect the twisted shielded pair to the AGM300 RS-485 connector (Page 7) using the same color code as used on the ADM800.

Integration with Building Management System

A second RS-485 connector inside the ADM800 allows a Building Management System to "talk" to the AGM300 network through the ADM800. The connection is established using a shielded twisted pair cable.

Use any of the remaining service knockouts to gain access to the interior of the ADM800. Locate the RS-485 connector marked "TO HOST" (Page 23) and remove it from the circuit board. Secure the wire leads to the connector orienting them as shown in the diagram below. Check to make sure that the polarity matches the wiring to the Building Management System. When you are through securing the connections, carefully plug the connector back onto the circuit board.

RS-485 Connector
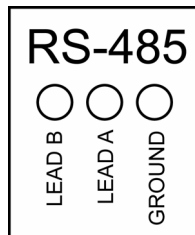
Changing Terminator Switch Settings

The terminator switch for the RS-485 "TO MONITORS" connector is shipped from the factory in the terminated or "IN" position. This is the correct setting if the ADM800 is connected to only one AGM300, or if it is the last device on a network chain. If the ADM800 is being installed in the middle of a network, the terminator must be moved to the "OUT" position. Refer to *Multiple AGM's* on Page 12.

The terminator switch for the RS-485 "TO HOST" connector is shipped from the factory in the terminated or "IN" position. This is the correct setting if the ADM800 is the last device on the network chain. If other devices are daisy chained through the ADM800, the terminator must be moved to the "OUT" position. Refer to *Connecting to a Building Management System* on Page 12.

Locate each terminator switch and determine its position. If it needs to be moved, carefully slide the switch to the proper position.
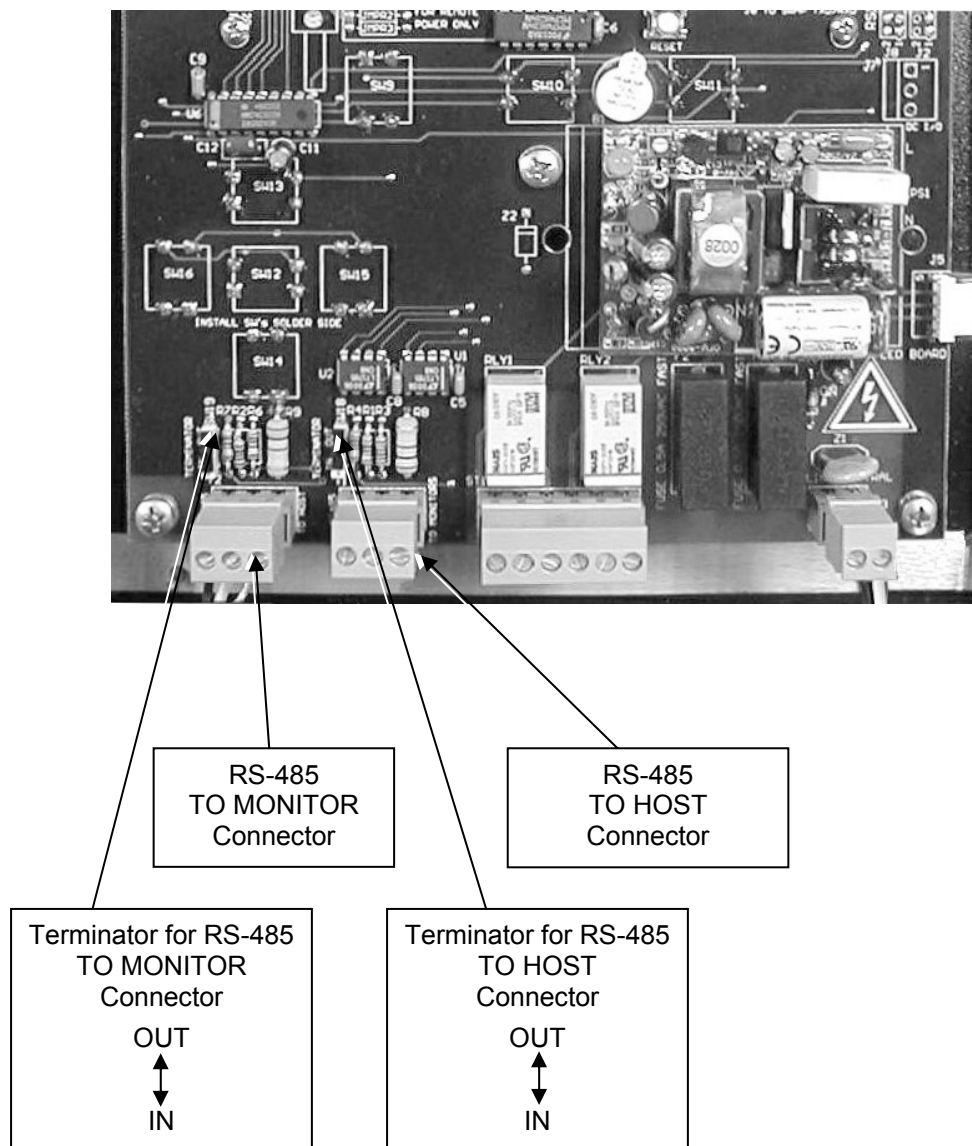
ADM800 - Connecting External Alarms

Overview

Two SPDT alarm contacts are available for the connection of external alarm devices. These alarms are useful for alerting the user to global conditions anywhere on the network. Each relay can be programmed to respond to alarm, fault, or monitor ON conditions (refer to *Setting Relay Parameters* on Page 36).

Connection

Use the AC conduit or any of the remaining service knockouts to gain access to the interior of the ADM800. Locate the relay connector (Page 23) and remove it from the circuit board. Secure the wire leads to the connector orienting them as shown in the diagram below. When you are through securing the connections, carefully plug the connector back onto the circuit board.

ADM800 Relay Connector

NOTE: Each relay can be connected as normally open (NO), or normally closed (NC).

Power for the external alarms can be tapped off the AC IN connector.

ADM800 Operation

ADM800 Exterior Schematic
Display Screen
Navigation Buttons
Cursor Pad
LED Indicators

Navigation Buttons

Display Screen

LED Indicators

Cursor Pad
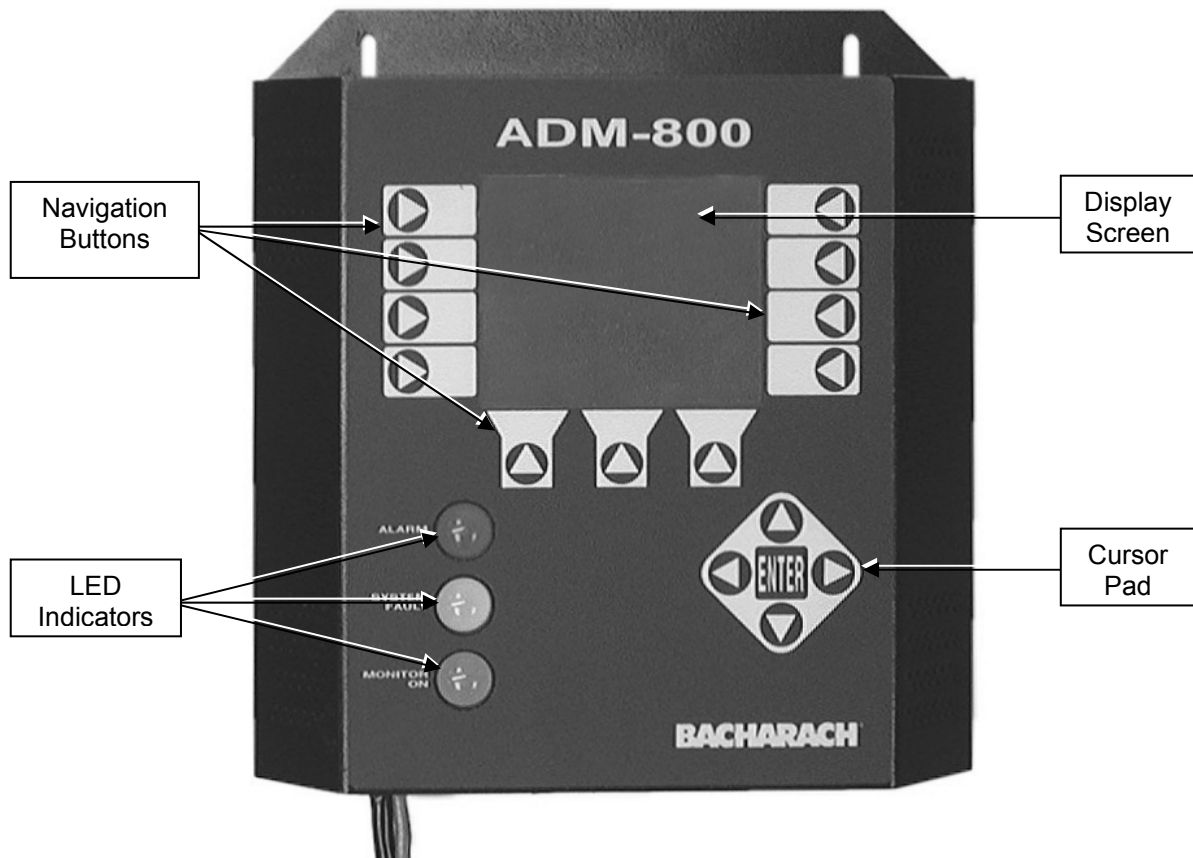
ADM800 - Overview

The ADM800 displays comprehensive information about the AGM300 network status and enables complete programming control of all system operations. The prominent features of the display module are discussed below.

Display Screen

The display screen is a back-lit LCD.

Control Keys

The 4 keys on each side of the display window are used to navigate between screen displays. A graphic box that is **open to the edge** of the window indicates that the adjacent control key is active. The 3 keys along the bottom of the window are also used to navigate between screens. A text block directly above the key indicates that the key is active. An active key can be used to navigate to another screen. A graphic box, that is not open to the edge, displays information only and the adjacent control key is inactive.

Cursor Key-Pad

The cursor key-pad is used to move about screens, enter setup information and choose between setup parameters. When entering information the LEFT/RIGHT keys move the cursor across an entry field, while the UP/DOWN keys scroll data entry options. The ENTER key is used to accept data entries.

LED Indicators

The three LED indicators provide an overview of network status.

GREEN	Glows when the system is operational.
RED	Glows when the ADM800 detects a leak, spill, or evacuate alarm condition anywhere on the network.
YELLOW	Glows when the ADM800 detects a system fault anywhere on the network.

Internal Audible Alarm

An internal audible alarm is provided that can be programmed to sound when there is an occurrence of the selected condition (refer to *Audible Alarm* on Page 35).
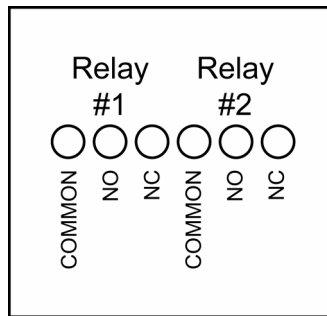
External Alarms

Additionally, 2 SPDT alarm contacts are provided for the connection of external alarm devices. These alarms are useful for alerting the user to global conditions anywhere on the network. Each relay can be programmed to respond to alarm, fault, or monitor ON conditions (refer to *Setting Relay Parameters* on Page 36).

ADM800 - Screen Displays

When first powered up a splash screen appears indicating the serial number and firmware revision number. After a brief moment the **System Screen** is displayed. Please refer to the Appendix for a logic diagram of all the screen displays.

There is a 15-minute warm-up period after power is first applied. Under "AGMS", "WARM UP" is displayed. The green indicator on the AGM will blink during the warm-up period.

IMPORTANT: DO NOT plug the gas-sample hose or inlet port of any zone. The monitor will perform a vacuum test during start up and a plugged zone will give a false indication.

System Screen

Display showing "WARM UP"
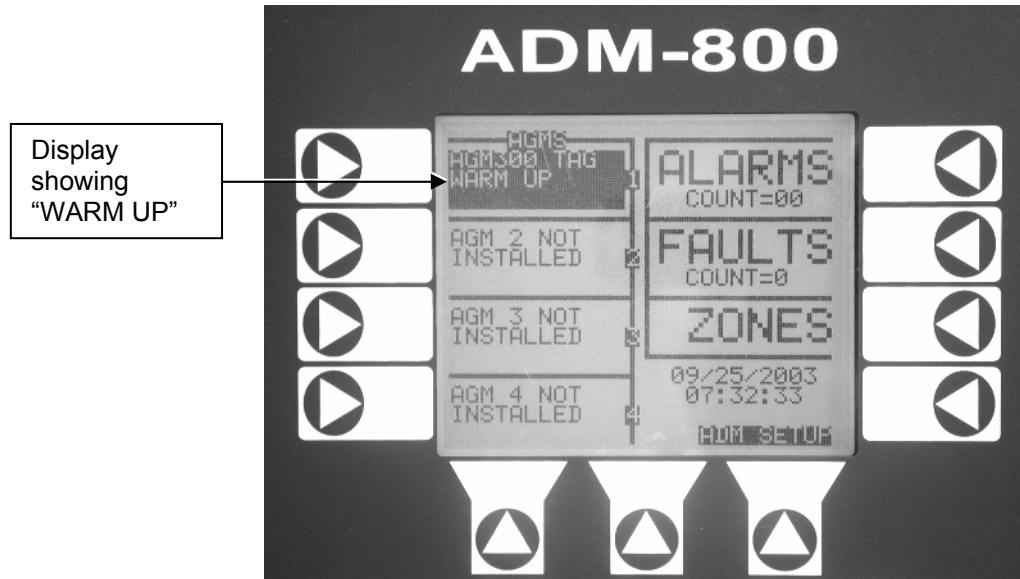
ADM800 - System Programming

Setup Parameters

Before working with the AGM300 network, several global parameters must be defined. Most of these are entered in the **ADM Setup Screens or via the PC software**. Parameters must also be defined for each AGM300 monitor connected to the network. These settings serve to identify each monitor and define how they operate. These are entered in the **AGM Setup Screens**. Finally, parameters must be defined for each individual monitoring zone. These are entered in the **Zone Setup Screens**.

Password Protection

The ADM800 can be password protected to prevent the unauthorized editing of setup parameters. When password protection is enabled, an operator may still navigate between screens to observe settings or monitor network status. The password can be alphanumeric.

The unit is shipped with password protection OFF. Entering a password in **ADM Setup Screen #1** enables password protection. Once protection is enabled the user will be prompted to enter the password when they first attempt to edit a setup parameter.

To enter a password:

1. From the top level **System Screen** press the ADM SETUP key to go to **ADM Setup Screen #1**.

2. From **ADM Setup Screen #1**, press the PASSWORD key.

3. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual characters.

4. Press ENTER to accept the new password or QUIT to revert to the previous setting.

After entering the password, a 30 minute time period will be allowed for entries; after which, the user will again be prompted to re-enter the password.

IMPORTANT: Please make note and save your password.

ADM Setup Screen #1

Password

ADM800 - Setup Programming

Setting the Clock

From the top level **System Screen** press the key adjacent to the date/time field to go to the **Clock Setup Screen**.

Clock Setup Screen

Use the LEFT/RIGHT cursor keys to move the cursor across the field to the value you wish to edit. Use the UP/DOWN cursor keys to modify the field value and press the ENTER key to accept your entries. When you are through editing the date/time value, do one of the following:

- Press the SET AGM CLOCKS key to synchronize all AGM300 monitors to the current date/time setting.
- Press the QUIT key to reject all edits and revert to the previous setting.
- Press the SET ADM CLOCK key to accept the current date/time setting.

Navigating to the 1st ADM Setup Screen
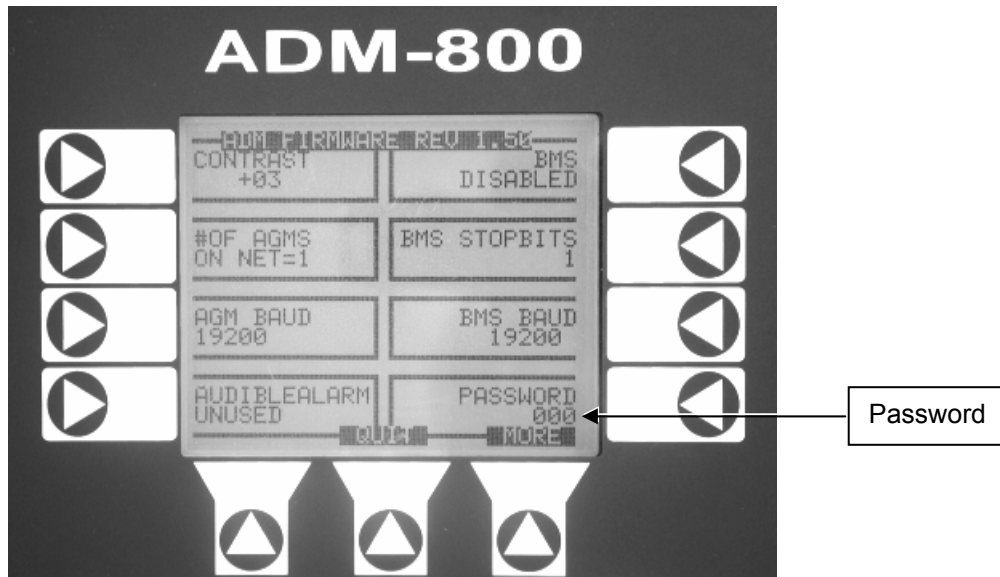
From the top level **System Screen** press the ADM SETUP key to go to **ADM Setup Screen #1**.

ADM Setup Screen #1
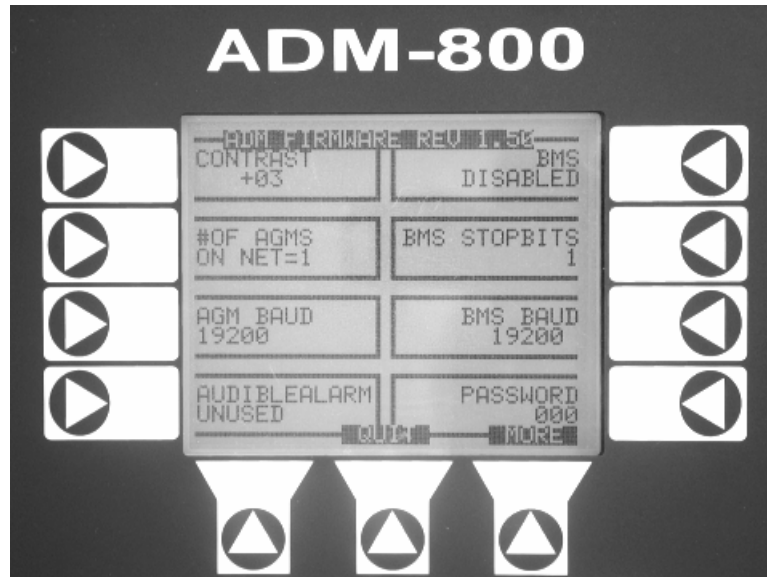
Contrast

This value sets the screen brightness.

1. Press the CONTRAST key to adjust its setting.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Number of AGM Units

This is the number of AGM300 monitors from 1–4 connected to the ADM800.

1. Press the #OF AGMS ON NET key to adjust the number.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

NOTE: When first powered up, the ADM800 will automatically detect all AGM300s on the network with unique node addresses. Refer to the heading *AGM Node Address Dip Switch Settings* on Page 11.

AGM Baud Rate

This is the baud rate of all AGM300 monitors connected to the network.

1. Press the AGM BAUD key to adjust the baud rate.
2. Use the UP/DOWN cursor keys to scroll the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.
4. The default valve is 19200.

NOTE: All AGM300s on the network must have the same baud rate.

Audible Alarm

This parameter selects the function of the ADM800's internal audible alarm.

1. Press the AUDIBLE ALARM key to adjust the setting.
2. Use the UP/DOWN cursor keys to select unused, monitor on, evacuate, spill, leak, fault, or alarm.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Enabling Building Management System Connection

This enables or disables the connection to a Building Management System.

1. Press the BMS key to adjust the setting.
2. Use the UP/DOWN cursor keys to toggle the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Building Management System Stop Bits

This value is the number of stop bits for the ADM800 on a Building Management System.

1. Press the BMS STOPBITS key to adjust the setting.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Building Management System Baud Rate

This is the baud rate of the Building Management System.

1. Press the BMS BAUD key to adjust the setting.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Password

This field is used to define a system password. The default setting is 000, which provides no password protection.

1. Press the PASSWORD key to enter a password.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual characters.
3. Press ENTER to accept the new password or QUIT to revert to the previous setting.

Navigating to the 2nd ADM Setup Screen

From **ADM Setup Screen #1** press the MORE key to go to **ADM Setup Screen #2**. Press the BACK key to return to **ADM Setup Screen #1**.

ADM Setup Screen #2
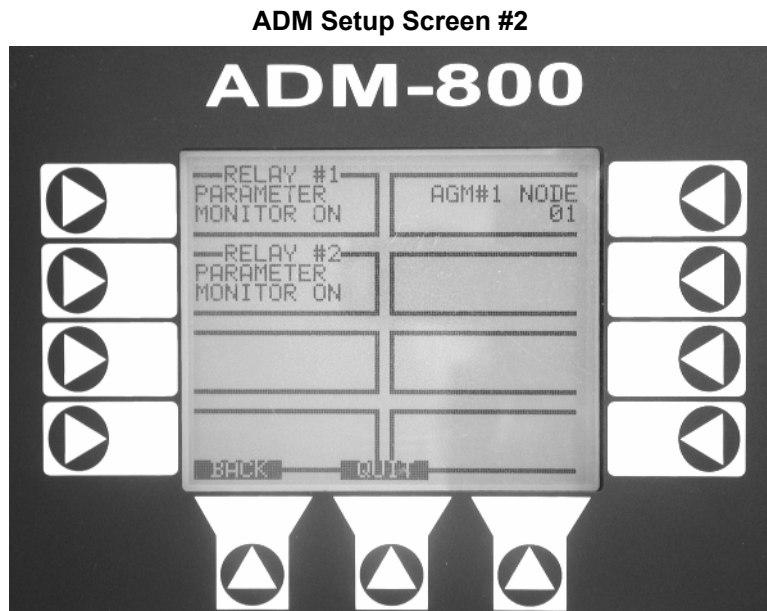
Setting Relay Parameters

This setting determines the function of relays 1 and 2 mounted inside the ADM unit.

1. Press the key adjacent to the relay parameter you want to adjust.
2. Use the UP/DOWN cursor keys to select unused, monitor on, evacuate, spill, leak, fault, or alarm.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

AGM Node Address

This value is the node address from 1 to 15 assigned to each AGM300 that is on the network. These values must match the DIP switch settings on each AGM300 circuit board. Refer to the heading *AGM Node Address Dip Switch Settings* on Page 11.

1. Press the key adjacent to the AGM# NODE you want to set.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Node Address DIP Switches in AGM Unit
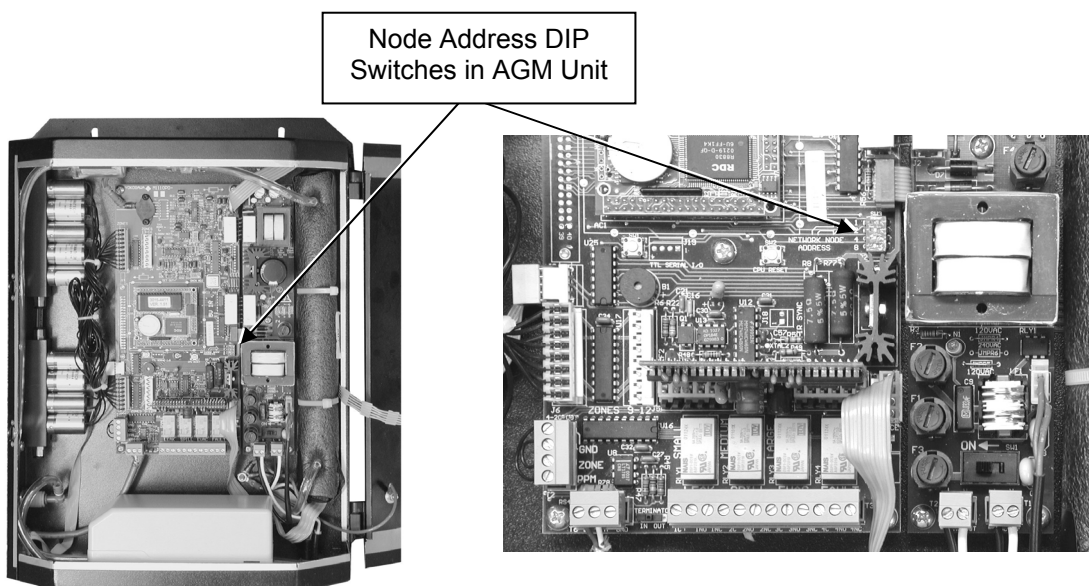
AGM300 - Setup Programming

Navigating to the 1st and then 2nd AGM Setup Screen

From the **System Screen**, press the key adjacent to the target AGM300 to go to that unit's **AGM Setup Screen #1**.

AGM Setup Screen #1
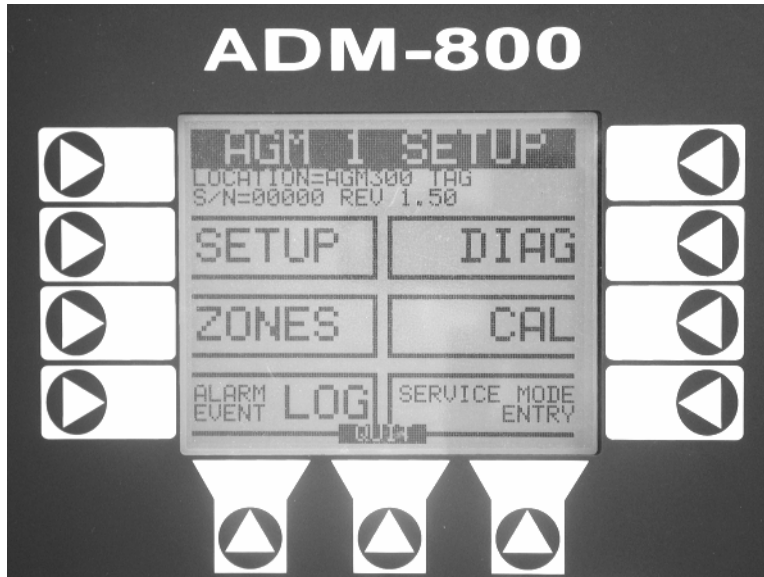
From **AGM Setup Screen #1** press the SETUP key to go to **AGM Setup Screen #2**. Press the QUIT key to return to the **System Screen**.

AGM Setup Screen #2
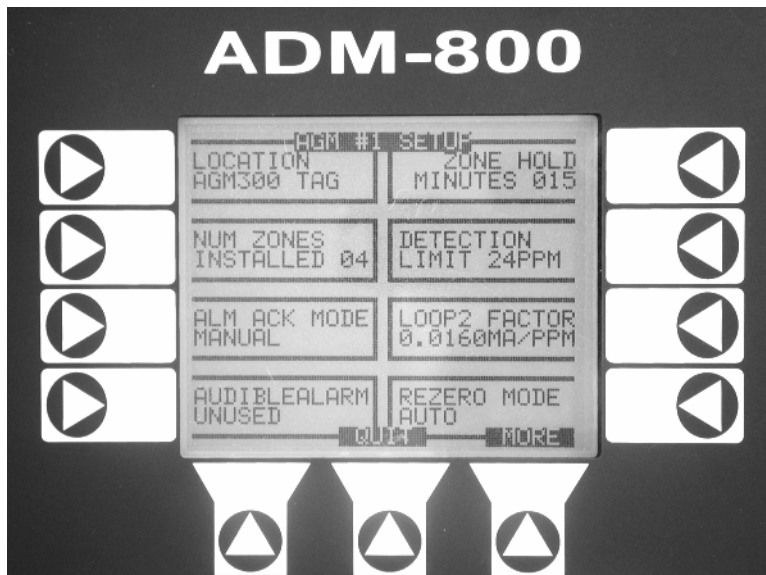
Location

This is the name you assign to the AGM300 to identify its location. It may have up to 12 alphanumeric characters.

1. Press the LOCATION key to modify the setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual characters.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Number of Zones Installed

IMPORTANT: Do not change the number of zones to deactivate excess zones. Instead, go to the individual zone that you wish to disable and set its distance to zero (refer to *Navigating to the 1st Zone Setup Screen* on Page 41). The monitor will perform a self-check on power-up, and if the number of zones detected does not agree with the number of zones installed a fault will occur.

1. Press the NUM ZONES INSTALLED key to adjust the setting.
2. Use the UP/DOWN cursor keys to modify the number.
3. Press ENTER to accept the new number or QUIT to revert to the previous setting.

NOTE: The AGM300 auto setting detects the number of zones present on power-up. DO NOT PLUG ANY ZONES. Plugging a zone will give the monitor a false indication during power up. The number detected on power up is the default value for this parameter.

Alarm Ack Mode

This function programs the relays in the AGM unit for latching or non-latching operation.

1. Press the ALARM ACK MODE key to adjust the setting.
2. Use the UP/DOWN cursor keys to toggle between settings.

   AUTO   –   Non-latching (Alarm relay will automatically de-energize when the gas level drops below its alarm point.)

   MANUAL –   Latching (Alarm relay remains energized, and will not release until the alarm condition has been manually acknowledged. Refer to *Acknowledging Alarms* on Page 52.)

3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Audible Alarm

This parameter selects the function of the AGM300's internal audible alarm device.

1. Press the AUDIBLE ALARM key to adjust the setting.
2. Use the UP/DOWN cursor keys to select unused, monitor on, evacuate, spill, leak, fault, or alarm.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Zone Hold Time

Sets the length of time a zone will be monitored when the zone hold feature is actuated (see *Zone Hold Mode* on Page 45). The default is 15 minutes. This parameter can be set to any value between 1 and 999 minutes.

1. Press the ZONE HOLD MINUTES key to adjust this setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Detection Limit

This is essentially a squelch setting that instructs the instrument to interpret PPM readings below the designated level as 0. You can set this value from 1 to 99 PPM.

1. Press the DETECTION LIMIT key to adjust this setting.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Loop 2 Factor

This sets the PPM scale factor for current loop number 2. To calculate the current output, multiply the scale factor by the PPM and add 4. For example, at the default scale factor of 0.016, a measurement of 100 PPM would generate a current of 5.6 mA. In no case can current output exceed the 20 mA capacity of the interface.

1. Press the LOOP2 FACTOR key to adjust the setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Re-Zero Mode

This parameter defines the frequency at which the instrument re-zeros the optical sensor.

1. Press the REZERO MODE key to adjust the setting.

2. Use the UP/DOWN cursor keys to toggle between settings.

   AUTO   –   Sets the instrument to re-zero every 10 minutes.
   ZONE CHANGE –   Sets the instrument to re-zero at each zone change. This is the most accurate setting but increases the time interval between measurement cycles.

3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Navigating to the 3rd AGM Setup Screen

From **AGM Setup Screen #2**, press the MORE key to go to **AGM Setup Screen #3**. Press the BACK key to return to **AGM Setup Screen #2**.

AGM Setup #3 Screen
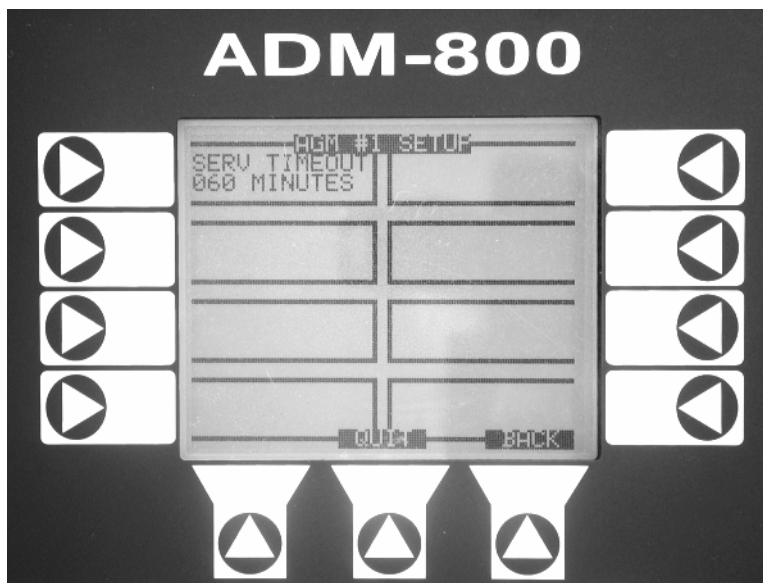
Service Timeout

Sets the length of time the Service Mode is in effect. Stops the monitor for up to 240 minutes (4 hrs) to allow for servicing the unit. See *Service Mode* on Page 61.

1. Press the SERV TIMEOUT key to adjust the setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

ADM800 - Zone Setup Programming

Navigating to the 1st Zone Setup Screen

There are two ways to display **Zone Setup Screen #1**:

• From the **System Screen** (Page 31) press the key adjacent to the AGM300 unit associated with the zone you wish to work with. Next, press the ZONES key; and then press the key adjacent to the desired zone.

• From the top level **Zone Screen** (Page 44) press the key adjacent to the zone you wish to work with. To select a different zone, use the UP/DOWN cursor keys or the NEXT key to scroll the screen display.

Zone Setup Screen #1
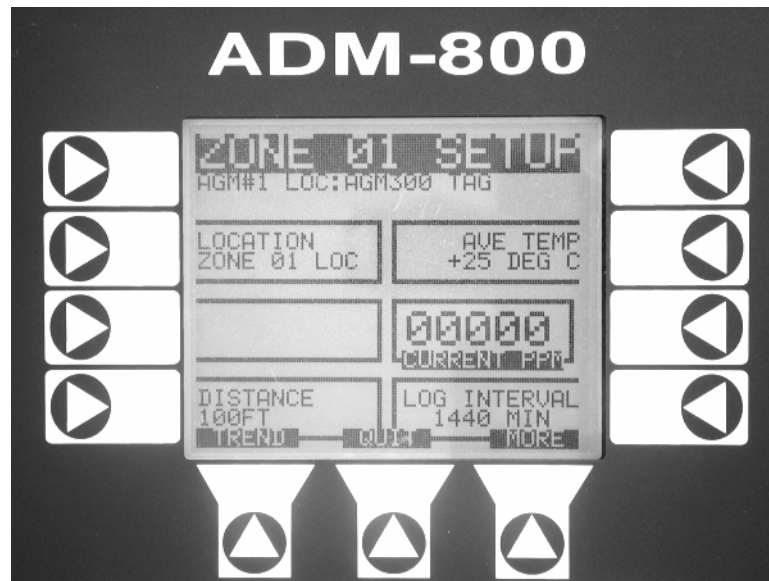
At **Zone Setup Screen #1**, use the LEFT/RIGHT cursor keys to switch the display to a different zone.

Location

This is the name you assign to the monitoring zone. It may have up to 12 alphanumeric characters.

1. Press the LOCATION key to enter or modify the name of the zone.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual characters.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Distance

This is the tubing length in feet from the AGM300 to the termination of the gas sample intake line. This value may range from 0 to 500 feet. The default value is 100 feet. Note that setting this value to "0" causes the zone to be bypassed during normal operation, and the word "DISABLED" in appear in place of the zone's PPM reading in the **Zone Screen** (Page 44).

1. Press the DISTANCE key to adjust the distance value.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Average Temperature

This temperature reading may be changed to the exact temperature at the sample point for greater accuracy. The adjustment range is from –50 to +70 degrees C.

1. Press the AVG TEMP key to adjust the temperature value.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Current PPM

This box displays the last PPM measurement recorded in this zone. You cannot modify this value.

Log Interval

Sets the length of time between entries in the trend log. The default is one entry every 1440 minutes (24 hours). A value of 000 indicates that each measurement for a given zone is logged into the trend log.

1. Press the LOG INTERVAL key to adjust the log interval value.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Navigating To the 2nd Zone Setup Screen

From **Zone Setup Screen #1** press the MORE key to go to **Zone Setup Screen #2**. Press the BACK key to return to **Zone Setup Screen #1**.

Zone Setup Screen #2
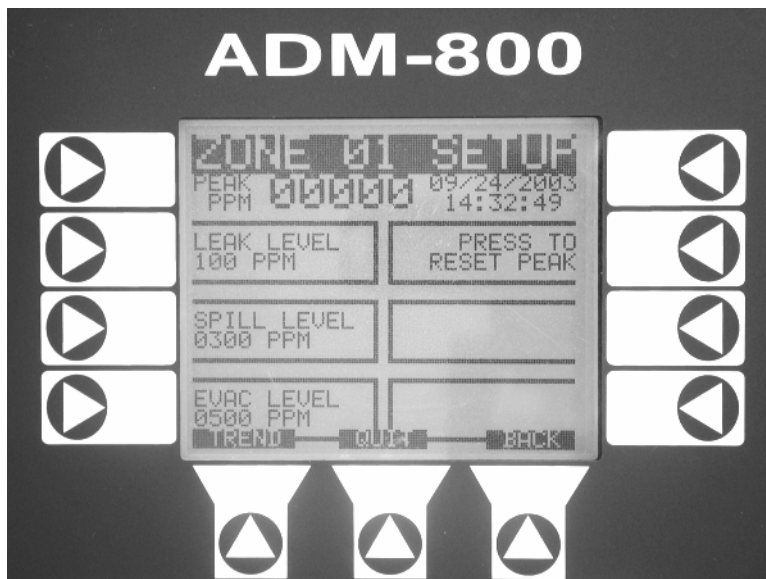
Leak Level

This is the concentration level in PPM that will activate a leak alarm condition.

1. Press the LEAK LEVEL key to adjust the value.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

NOTE: This value must be less than the spill level.

Spill Level

This is the concentration level in PPM that will activate a spill alarm condition.

1. Press the SPILL LEVEL key to adjust the value.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

NOTE: This value must be less than the evacuate level and greater than the leak level.

Evacuation Level

This is the concentration level in PPM that will activate an evacuate alarm condition.

1. Press the EVAC LEVEL key to adjust the value.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

NOTE: This value must be greater than the spill level.

Re-Setting the Peak PPM Value

Pressing this key resets the current peak PPM level stored in memory and displays it at the top of the screen.

General Operation

Functional Overview

Normally each AGM300 will sequentially perform measurements on its active zones without user input. The total time it takes an AGM300 to complete a measurement cycle is directly proportional to the number of active zones and the physical length of the sample-gas lines. Monitors linked together on a network operate independently of each other and consequently complete their respective measurement cycles at different rates.

The ADM800 operates by polling the network approximately once every 12 seconds to determine the current status of each AGM300 monitor. If more than one AGM300 is connected to the network, it will sequentially poll each monitor for its status. As a practical matter this simply means that the more complicated the network, the longer it will take the ADM800 to update the status information for all zones.

To display all the zones being monitored, go to the **System Screen** (page 31) and press the ZONES key.

Working with the Zone Screen

The top level **Zone Screen** provides a summary view of zone activity across the network. Each screen displays information from a single AGM300 monitor as indicated at the top of the display. Each screen can display information for up to 8 zones, and depending on the configuration of the system, there can be up to two screens for each AGM300. Use the UP/DOWN cursor keys or the NEXT key to scroll the screen display.

Each box displays the zone location and the last PPM measurement. A blinking box indicates that a measurement is currently being taken in that location. An inverse flashing box indicates an alarm condition in that zone.

Use the LEFT/RIGHT cursor keys to scroll through the zones.

Zone Screen
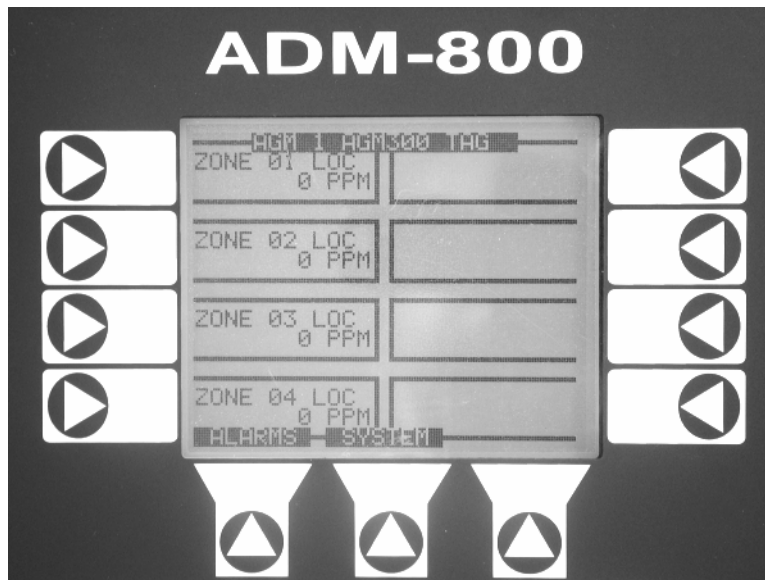
To further investigate the status of any zone, press the adjacent key to go to the **Zone Setup #1 Screen** (Page 41). You may also press the SYSTEM key to go to the **System Screen** (Page 31).

Zone Hold Mode

A zone can be placed on hold and continuously monitored for a length of time determined by the Zone Hold Time value (Page 38). To place a zone on hold, press and hold down the key adjacent to that zone until you hear a beep. The word "HOLDING" appears to identify which zone is being held.

Zone Screen (Hold Mode)

Zone on Hold →
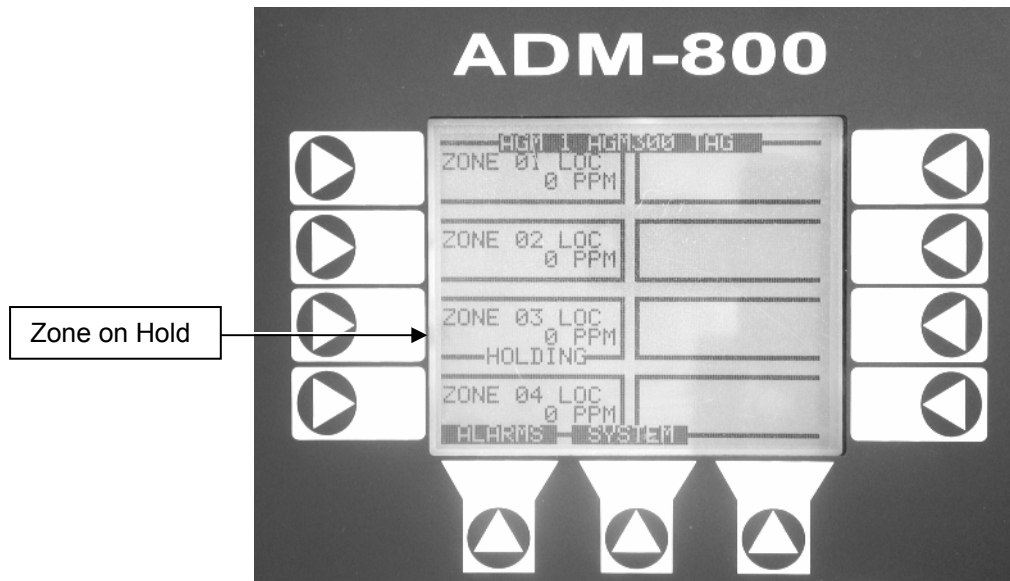
Once in the hold mode you can further investigate the status of the zone by pressing the adjacent key and going to the **Zone Setup #1 Screen** (Page 41). To release the zone from the hold mode, press and hold down the adjacent key until the unit beeps and the screen display reverts to normal. You may also press and hold down the key adjacent to any other zone to release the current zone and put the new zone on hold.

Alarm Conditions

When an alarm condition is detected anywhere on the network the red ALARM LED will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 28 & 35).

An inverse flashing box indicates an alarm condition in the affected zone.

Zone Screen (Alarm Mode)

Zone in Alarm →
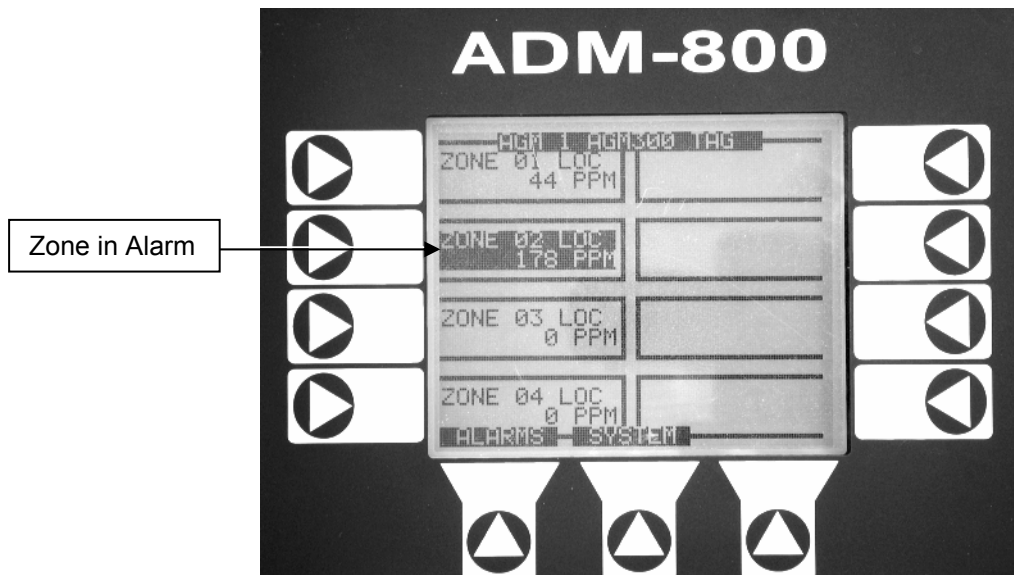
If the current **Zone Screen** appears normal, scroll through the displays using the NEXT/BACK keys or the UP/DOWN cursor keys until you locate the affected zone. You can further investigate the status of the affected zone by pressing the adjacent key and going to the **Zone Setup #1 Screen** (Page 41). You may also press the ALARM key to go directly to the **Alarm Summary Screen** (Page 50). See *Working with Alarms* on Page 50 to learn more about responding to alarms.

Fault Conditions

If a system malfunction occurs, the yellow FAULT LED will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 28 & 35).

From the top level **Zone Screen** (Page 44), press the SYSTEM key to go to the **System Screen** (Page 31) and then press the FAULT key to go to the **Fault Screen** (Page 54). See *Working with System Faults* on Page 54 to learn more about responding to system faults.

Working with the System Screen

The **System Screen** provides a summary view of the entire AGM300 network. The boxes on the left side of the screen indicate the status of each AGM300 monitor including the name, the current zone, and whether fault or alarm conditions are present on the network.

System Screen

Alarm Conditions

When an alarm condition is detected anywhere on the network the red ALARM LED will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 28 & 35).

The ALARM box in the upper right hand corner of the screen will blink and the count value will change to indicate the total number of alarm conditions on the network. To investigate an alarm, press the ALARMS key to go to the **Alarm Summary Screen** (Page 50). See *Working with Alarms* on Page 50 to learn more about responding to alarms.

System Screen (Alarm Mode)

Alarm Condition
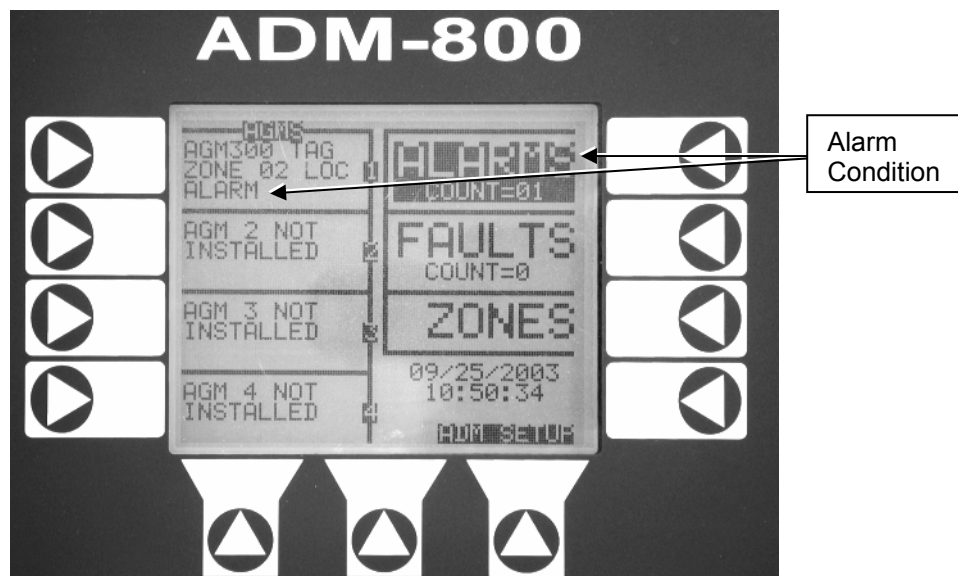
Alarm Log

From the **System Screen** press the key adjacent to the AGM300 unit that you wish to view.

AGM Setup #1 Screen

Press the ALARM EVENT LOG key to display **Alarm Log Screen**.

Alarm Log Screen
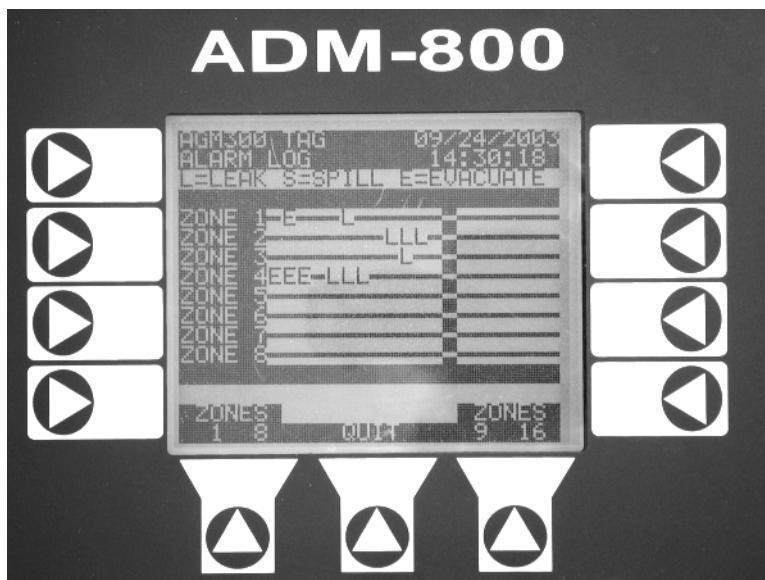
Use the LEFT/RIGHT and UP/DOWN cursor keys to move through the log.

The Alarm log shows the last 20 alarm events. An alarm event is the occurrence of any alarm, any change in alarm level, or the clearing of any alarm. The alarm level is indicated by an L (leak), S (spill), or E (evacuate). The time and date of the alarm are displayed when the cursor is placed over the alarm.
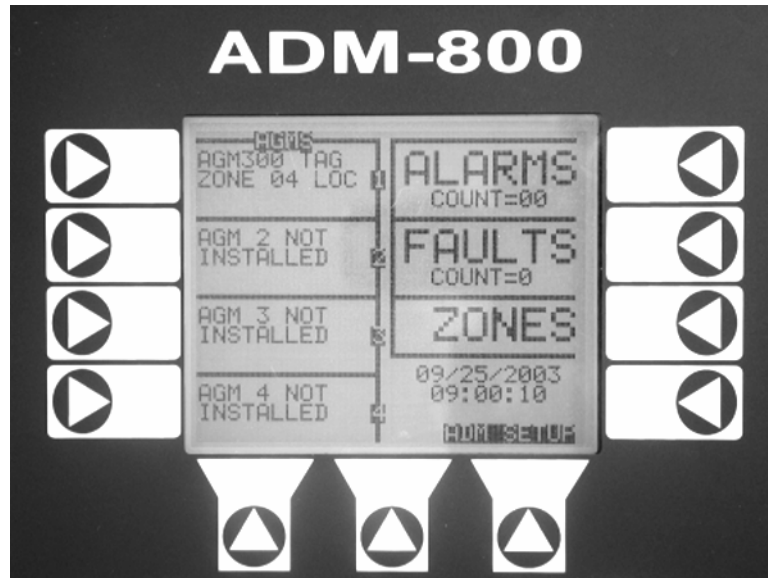
Fault Conditions

If a system malfunction occurs, the yellow FAULT LED will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 28 & 35).

The FAULT box on the right of the screen will blink and then counts the number of AGM units on the system with a fault. To investigate a fault, press the FAULTS key to go to the **Fault Screen** (Page 54). See *Working with System Faults* on Page 54 to learn more about responding to system faults.

System Screen (Fault Mode)

Fault Condition
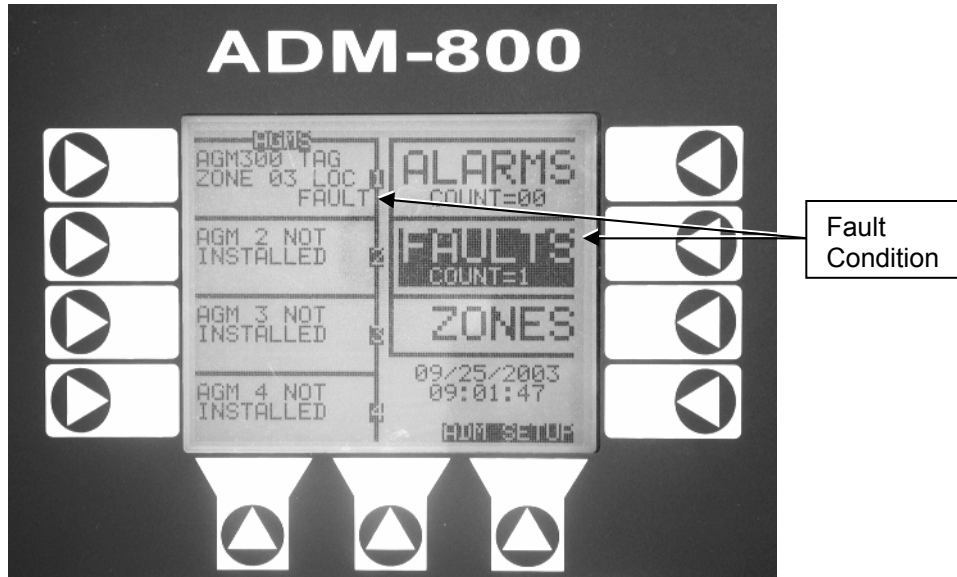
Working with Alarms

Functional Overview

If the PPM level for any zone exceed its designated spill, leak, or evacuate thresholds, an alarm condition will be created. Once the AGM300 completes a measurement cycle in the affected zone the alarm condition will be indicated. At that time the red ALARM LED on the AGM300 will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 17 & 38).

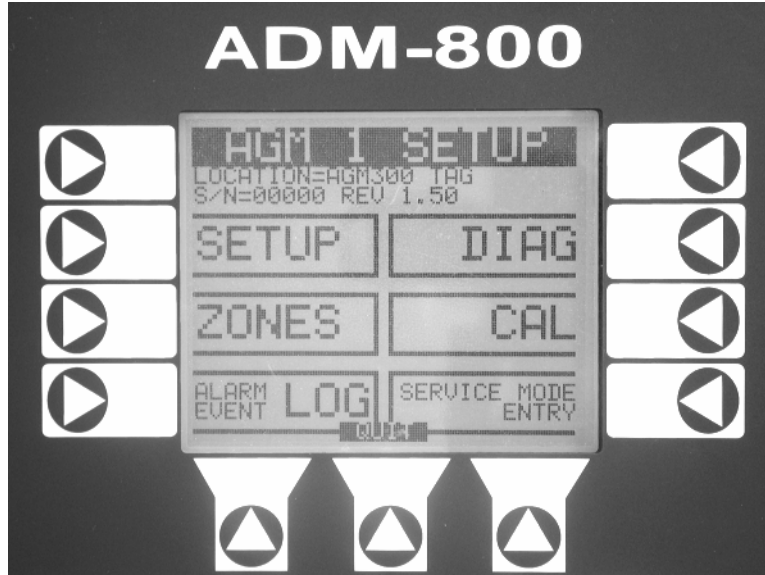The next time the ADM800 polls the affected monitor its red ALARM LED will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 28 & 35).

The alarm condition may or may not have to be acknowledged for the system to return to normal operation.

Responding To Alarms

There are two screens from which an operator can respond to alarms:

• From the **System Screen** (Page 31) press the key adjacent to the blinking ALARMS field to go to the **Alarm Summary Screen**.

• From the top level **Zone Screen** (Page 44) press the ALARMS key at the bottom of the display window to go to the **Alarm Summary Screen**.

Alarm Summary Screen
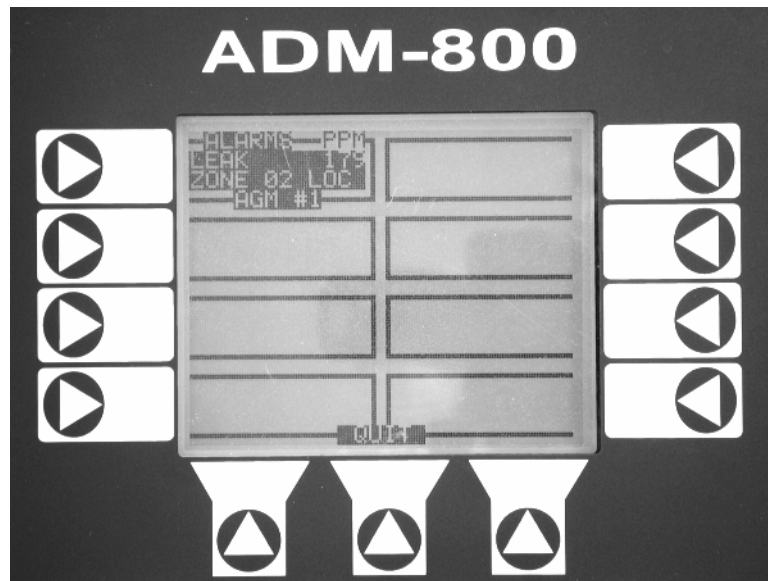
The **Alarm Summary Screen** displays a list of all alarm conditions pending across the network. The screen is divided into 8 boxes, with each box representing a single alarm. If more than 8 alarms are pending additional pages can be displayed by pressing the MORE key.

Each box displays the zone number, zone name, and the current PPM reading. A flashing box indicates an alarm that has not been acknowledged. A static box represents an alarm that has been acknowledged but has not yet been cleared from the system.

Alarm Detail Screen

To further investigate an alarm, press the adjacent key to go to the **Alarm Detail Screen**.

Alarm Detail Screen
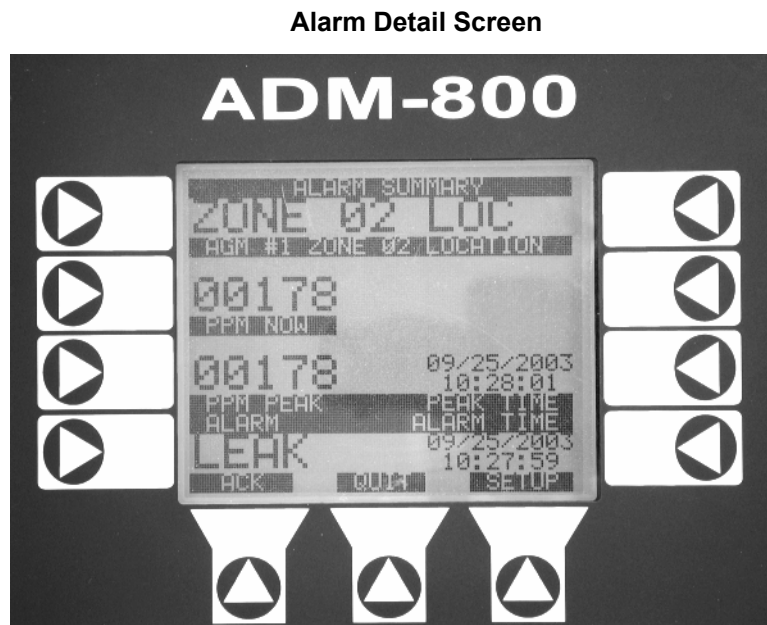
The **Alarm Detail Screen** displays more comprehensive information about the nature of the alarm including:

- Complete location information
- Current PPM
- Peak PPM and peak time
- Type of alarm, alarm time, and date

This screen includes three active navigation keys at the bottom of the display.

ACK Acknowledges the alarm as described in the next section

QUIT Returns you to the **Alarm Summary Screen**

SETUP Takes you to the **Zone Setup #1 Screen** (Page 41), which enables you to review the zone setup parameters and access the **Trend Screen**.

Acknowledging Alarms

Each pending alarm may require, depending upon selected alarm mode, acknowledgment before the system returns to normal operation (refer to *Alarm Ack Mode* on Page 38). To acknowledge an alarm, navigate to the **Alarm Detail Screen** and press the ACK key as previously described. You will then be returned to the **Alarm Summary Screen** and the box associated with that alarm will no longer be blinking, indicating that the alarm has been acknowledged. Repeat this procedure to acknowledge any remaining alarms.

Alarm Summary Screen (Acknowledge Mode)
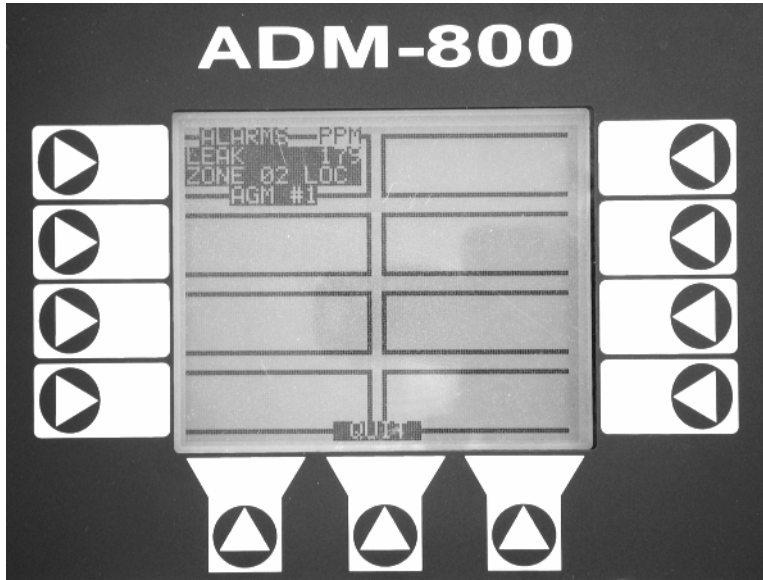
Once all the alarms associated with a given AGM300 are acknowledged, its red ALARM LED will turn off and any external alarms connected to the AGM300 relays will de-activate. All pending alarms across the entire network must be acknowledged before the ADM800 returns to normal operation. Once that occurs, its red ALARM LED will turn off and any associated external alarms connected to the ADM800 relays will de-activate.

Keep in mind that the system will continue to generate new alarms if PPM values above the alarm thresholds are detected.

Working with the Trend Screen

Overview - Log Interval

The AGM300 retains a data log of 100 measurements for each zone. The log interval is the number of minutes from 1 to 1440 between each log point. This parameter can be changed from the **Zone Setup #1 Screen** (Page 41).

The default setting for this parameter is 1440 minutes (24 hours). If the log interval time is set to 0, then a measurement is recorded in the trend log after *every measurement cycle*. Therefore, after the trend log is filled it will contain the last 100 measurement points for a zone. If you want the data logged less frequently you should increase this value. It is important to remember that cycle time is dependent on many factors, including the number of zones being monitored, input line length, and the run zeroing mode selected. Before changing this value it may be useful to first review the log data using the **Trend Screen** to determine the nominal cycle time.

Navigating To the Trend Screen

Access the **Trend Screen** from either the **System Screen** or **Zone Screen** as follows:

• From the **System Screen** (Page 31) press the key adjacent to the AGM300 unit associated with the zone you wish to work with to display that monitor's **AGM Setup Screen #1.** Next, press the ZONES key to go to **Zone Setup Screen #1**, and then press the TREND key at the bottom of the display to go to the **Trend Screen**.

• From the top level **Zone Screen** (Page 44) press the key adjacent to the zone you wish to work with to first display its **Zone Setup Screen #1**. Then press the TREND key at the bottom of the display to go to the **Trend Screen**.

Trend Screen
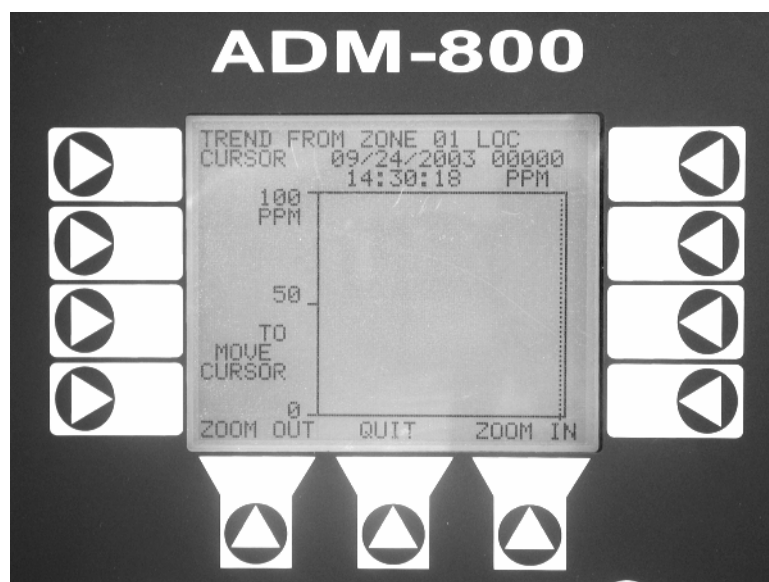
The trend graph opens with the cursor located over the most recent data point. Use the LEFT/RIGHT cursor keys to move the cursor to different data points. Holding a key down will cause cursor to move rapidly across the screen. As you move the cursor position, the date and time of that reading, along with the PPM value, are displayed at the top of the screen above the graph. The trend graph is automatically scaled to accommodate the largest PPM value displayed. The ZOOM OUT and ZOOM IN keys allow you to adjust the vertical scale of the graph.

The trend data is stored on a first-in, first-out basis. After 100 trend values have been stored the 101st value will replace the first value stored. Therefore, in normal operation, when entering the trend mode the cursor will be located at the most recent data point. The data points to the left of the initial cursor location will be the next most recent. The data point to the right will be the oldest data point in the buffer and will be over written by the next data point.

Working with System Faults

Functional Overview

If a system malfunction occurs, the AGM300 will detect the problem and cause its yellow FAULT LED to glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 17 & 38).

The next time the ADM800 polls the affected monitor its yellow FAULT LED will also glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (Pages 28 & 35).

Depending on the nature of the fault, the AGM300 may or may not continue to operate normally. Under a non-critical fault condition, the AGM300 will continue to measure and log data, but some peripheral functions may be compromised. Under a critical fault condition, action is required for the AGM300 to operate normally. The table on the following page lists the various fault conditions and explains what action should be taken to correct the problem.

Navigating to the Fault Screen

First, display the **System Screen** (Page 31). Next, press the key adjacent to the target AGM300 unit to go to that monitor's **AGM Setup Screen #1** (Page 37). Finally, press the FAULTS key to display the **Fault Screen** of the selected monitor.

Fault Screen
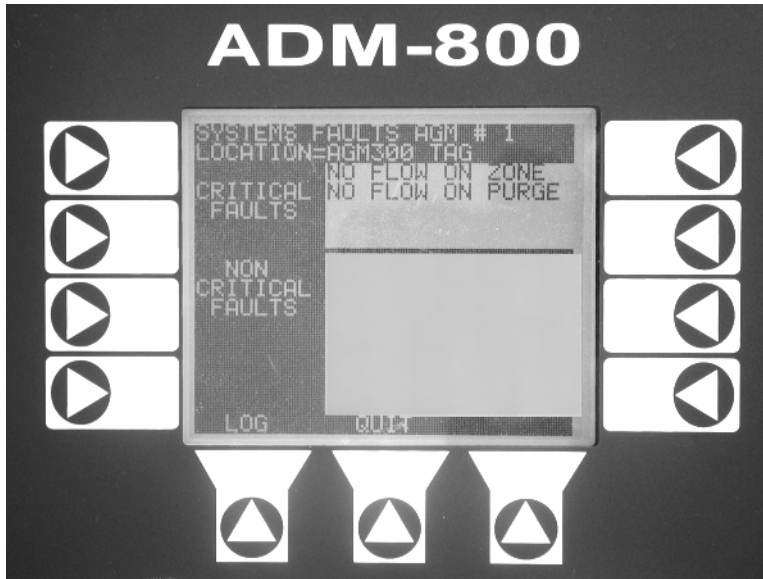
<u>CRITICAL FAULTS</u>

- **NO FLOW ON ZONE** – Go to the **System Screen** (Page 47) and press the ZONES key. The **Zone Screen** (Page 44) will display a "NO FLOW" message in each individual zone affected. Check for a blockage in the air sample line or at the line end filter. Once the blockage has been cleared, the AGM300 will return to normal operation after the zone has been sampled. **NOTE**: *This can take some several minutes since it is dependent upon how many zones there are and their lengths.* The AGM300 will clear the fault the next time it polls the effected zone and the ADM800 will return to normal operation the next time that it polls the AGM300.

- **NO FLOW ON PURGE** – Check the purge line for a blockage. Verify that the length of the purge line and exhaust line do not exceed 300 feet in length.

- **NO FLOW DETECTED** – Check for proper pump operation. Check the water trap – drain if necessary.

- **CLIPPING FAULT** – The detector voltage may be out of tolerance. Check the **Diagnostic Screen** (Page 59) for the DET voltage, AVE voltage and ZERO voltage. Call the factory with this information for further instructions.

- **REZERO VOLT TOL** – The detector output voltage is out of tolerance. Check the **Diagnostic Screen** as in item 4 and contact the factory for assistance.

- **TRIGGER FAULT** – No trigger from IR source pulser. Contact factory with all information from the **Diagnostic Screen** for further instructions.

<u>NON CRITICAL FAULTS</u>

- **BOX TEMP FAULT** – Enclosure's internal temperature is outside normal range (or IR sensor has failed). Check the installation to verify that the monitor is not being subjected to extreme temperatures. Verify that the ventilation holes are not obstructed. Check the **Diagnostic Screen** for the ZERO temperature, BNCH temperature and BOX temperature. Call the factory with this information for further instructions.

- **BENCH TEMP FAULT** – Optical bench is outside of normal operating range (or sensor has failed). Check the installation to verify that the monitor is not being subjected to extreme temperatures. Check the **Diagnostic Screen** for the ZERO temperature, BNCH temperature and BOX temperature. Call the factory with this information for further instructions.

- **PRESSURE SENSOR** – Manifold pressure is outside normal operating range (or sensor has failed). Check the **Diagnostic Screen** and record ALL data. Call the factory with this information for further instructions.

- **LOOP FAULT** – This would only be displayed if the dual 4–20 mA option was installed and one or both current loops are open. Check the wiring to load/monitoring circuit on both 4–20 mA loops.

- **CONFIG FAULT** – There is an error in **AGM Setup Screen #2** – Number Zones Installed field, or in **ADM Setup Screen #1** – Number of AGMS on Network field. Check that the number of zones installed for each AGM unit and the number of AGM units on the network are properly programmed. Check to ensure that the manifold solenoid cable connector in each AGM unit is securely fastened to its terminal connector. Check for an illegal parameter. If necessary, reset to the factory default settings.

Reset to Factory Default Settings

IMPORTANT: Performing this function wipes out all program parameters, alarms, faults, trends and log files.

<u>Resetting the AGM300</u> – Press and hold down the Factory Default switch inside the AGM300 (Page 7); cycle the AC power OFF and then ON; listen for five beeps; and then release the switch. Reprogram the AGM300 per Section *AGM300 – Setup Programming* on Page 37.

<u>Resetting the ADM800</u> – Occasionally it will be necessary to rest the ADM800 to factory default settings. From the **System Screen** (Page 31), press and hold the key adjacent to the ALARMS function; cycle AC power OFF and then ON; listen for five beeps; and then release the key.

Clearing System Faults

If the fault condition is associated with an AGM300, the monitor will return to normal operation soon after the problem is corrected. At that time the YELLOW LED will turn off and any external alarms connected to the monitor's alarm relays will also turn off. The ADM800 will return to normal operation the next time it polls the affected AGM300 monitor.

Once the system malfunction has been corrected it may take some time for the fault condition to clear completely. If the fault is associated with a specific zone, the AGM300 must first cycle back to the affected zone before it returns to its normal operating mode. At that time the yellow FAULT LED will turn off and any external alarms connected to the AGM300 unit will de-activate. The ADM800 will return to normal operation the next time it polls the affected monitor.

Viewing Fault Log

A data log of the last 20 fault conditions is retained in memory. From the **Fault Screen** (Page 54) press the LOG key to view a display of the fault log.

Fault Log Screen
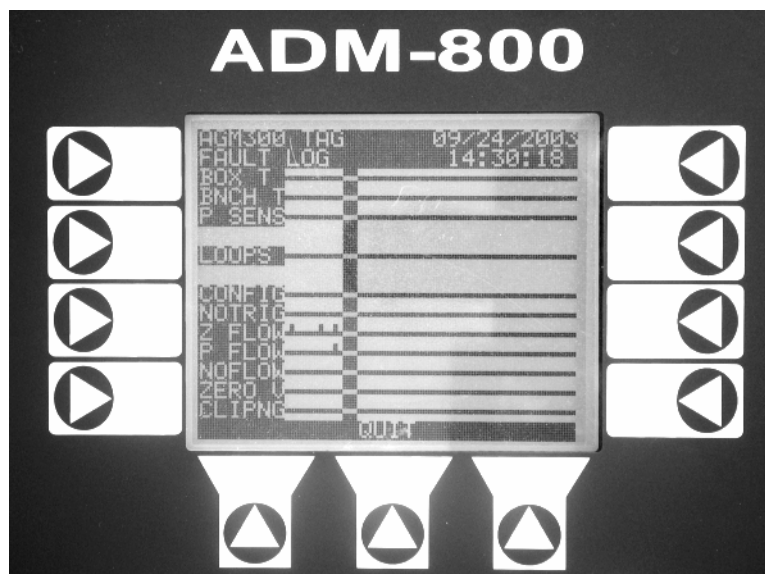
This screen lists potential fault conditions in the left column and displays a check mark indicating which problems were associated with each fault condition as represented by the vertical cursor bar. As you move the bar horizontally using the LEFT/RIGHT cursor keys, the date and time the fault condition was detected is displayed in the upper right hand corner of the display window.

Anytime the fault status changes, there is an entry in the fault log, both when the fault occurs and when it is cleared.

Working with the Calibration Screen

Overview

The **Calibration Screen** is used to adjust the IR sensor's calibration factor.

IMPORTANT: Changing information on CAL FACTORS will VOID the factory calibration. Typically, the unit will remain within the factory-calibrated accuracy indefinitely and no calibration is required. Complex software algorithms adjust for temperature drift, IR source aging, and pressure changes in order to keep the unit within factory accuracy specifications.

Navigating to the Calibration Screen

First, display the **System Screen** (Page 31). Next, press the key adjacent to the target AGM300 unit to go to that monitor's **AGM Setup Screen #1** (Page 37). Finally, press the CAL key to go to the selected monitor's **Calibration Screen.**

Calibration Screen
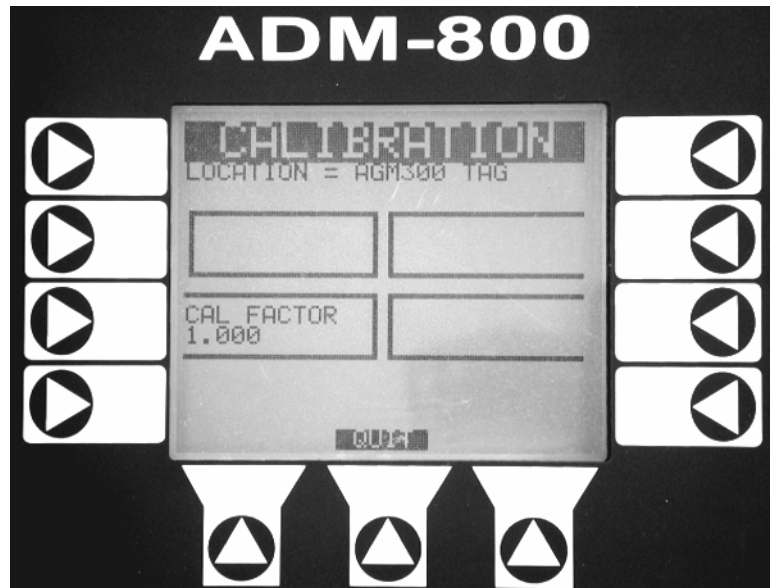
Adjusting Calibration Factor

The factory default cal factor for standard units is 1.000.

Proceed as follows to adjust the current calibration factor:

1. Press the CAL FACTOR key to edit the value.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
3. Press ENTER to accept the new entry or QUIT to revert to the previous setting.

Calibration Procedure

The CAL FACTOR is determined by sampling a known dilution of ammonia gas. The sample must be prepared to less than half the desired accuracy, and the concentration must be corrected for ambient temperature and pressure at the time of measurement.

Calibration is best performed at or near full scale (10,000 PPM). It can, however, be done at any concentration, and ideally in the range where maximum accuracy is desired down to, but not below, 100 PPM.

A cylinder of ammonia gas at a certified PPM level must be used to assure sampling occurs at ambient conditions. A minimum sample size of 5 liters is required.

The AGM should be operating for at least one hour prior to performing a calibration.

Prepare the AGM300 for sampling by initially setting its CAL FACTOR to 1.000 (Page 57). Next, set up the AGM300 for a logging interval of zero minutes (Page 42), and place the AGM300 in its zone hold mode for the zone you wish to set up (Page 45).

Connect the sample bag directly to the intake port for the zone you have set up and allow the AGM300 to sample the entire bag. When sampling is complete view the trend data for the zone used to sample (Page 53). Read the measured PPM by placing the cursor on the spikes cause by the sample. If the bag was large enough for multiple samples, average the most stable ones.

The new CAL factor is computed by dividing the known gas value by the measured value. Typically this value will be between 0.95 and 1.05. Enter the computed CAL factor into the monitor using the ADM800 (Page 57) or PC interface. This value is stored in non-volatile memory.

Working with the Diagnostic Screen

Overview

The **Diagnostic Screen** displays reference values for use by repair technicians for troubleshooting purposes.

Navigating to the Diagnostic Screen

Display the **System Screen** (Page 31); press the key adjacent to the target AGM300 unit to go to that monitor's **AGM Setup Screen #1** (Page 37); and then press the DIAG key to go to the selected monitor's **Diagnostic Screen.**
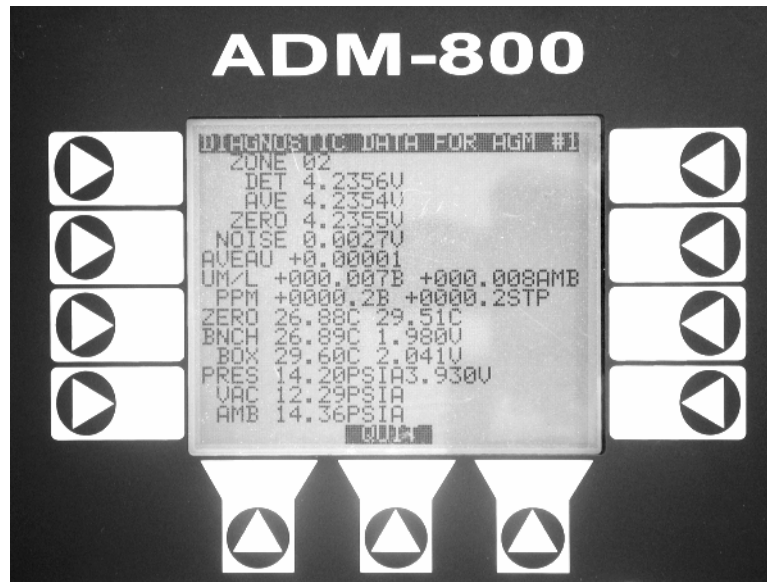
Diagnostic Screen

Diagnostic Screen Overview

The **Diagnostic Screen** contains sensor data and status information useful for troubleshooting various fault conditions. An explanation of each line is given below along with normal operating ranges.

> **LINE 1**: **Detector Voltage** – This is the peak-to-peak output of the IR sensor, in the absence of ammonia gas this value can range from 3.900V to 4.500V.

> **LINE 2: Average Detector Voltage** – This is simply a running average of the values displayed in line 1.

> **LINE 3: Zero Voltage** – This is the IR sensor output that was stored during the last purge cycle and has the same range as line 1.

> **LINE 4: Noise** – This is a 16 point running average of the noise portion of IR bench output. This reading is valuable mainly when ammonia gas is <u>NOT</u> present.

> **LINE 5: Average Absorbency** – This is the optical absorbency computed from the values in lines 2 and 3. In the absence of ammonia gas the absorbency is 0.000AU. When sampling gas, its value varies proportionally with the gas concentration.

> **LINE 6: uMoles/L** – This is the absolute concentration in micro-moles per liter of ammonia gas based on line 4 and the internal calibration. There are two figures given. The first (which is annotated by a B) is the actual measurement at the IR bench. The second is the calculated value corrected to ambient conditions (temperature + pressure).

LINE 7: PPM – Parts Per Million is the volume concentration referenced to standard temperature and pressure and is computed from lines 5, 8 and 13. There are two figures given. The first (annotated by a B) is the actual PPM at the IR bench. The second is a PPM reading normalized to standard temperature and pressure.

LINE 8: Zero Temperature – This line contains the sensor and enclosure temperature measured and stored during the last purge cycle in degrees C.

LINE 9: Bench Temperature – This is the current IR sensor temperature in degrees C as well as the raw voltage coming from the temperature sensor itself. This value can range from ambient to ambient +15 degrees C.

LINE 10: Box Temperature – This is the current internal enclosure temperature along with the raw voltage from the temperature sensor, and has the same range as line 9.

LINE 11: Pressure – This is the current absolute manifold pressure in PSIA along with the output voltage of the pressure sensor. This value should always be 0.2 to 1.0 PSIA below ambient (line 13).

LINE 12: Vacuum – The vacuum pressure is measured every purge cycle by closing all sample valves. Its value is typically 2.5 to 4.0 PSIA below ambient (line 13).

LINE 13: Ambient – Ambient pressure is measured every purge cycle with the sample pump off and the manifold open. Its value is weather and altitude dependent and can range from 10.0 to 15.5 PSIA.

Service Mode

When activated, the Service Mode will disable a specific AGM300 unit for a specified length of time. The default is 60 minutes. This time interval can be changed per Section *Service Timeout* on Page 40.

IMPORTANT: Note that while in the Service Mode no measurements are made, nor are any alarms activated.

From the **System Screen** (Page 31), select the key adjacent to the AGM unit you wish to place into its Service Mode. From **AGM Setup Screen #1** (Page 37) press the SERVICE MODE ENTRY key *twice within 3 seconds*.

Note that the **System Screen** will show what monitors are in the Service Mode.

To exit the Service Mode, again press the SERVICE MODE ENTRY key *twice within 3 seconds*.

AGM Setup Screen #1

Press this key twice within 3 seconds to place the selected AGM unit into its Service Mode
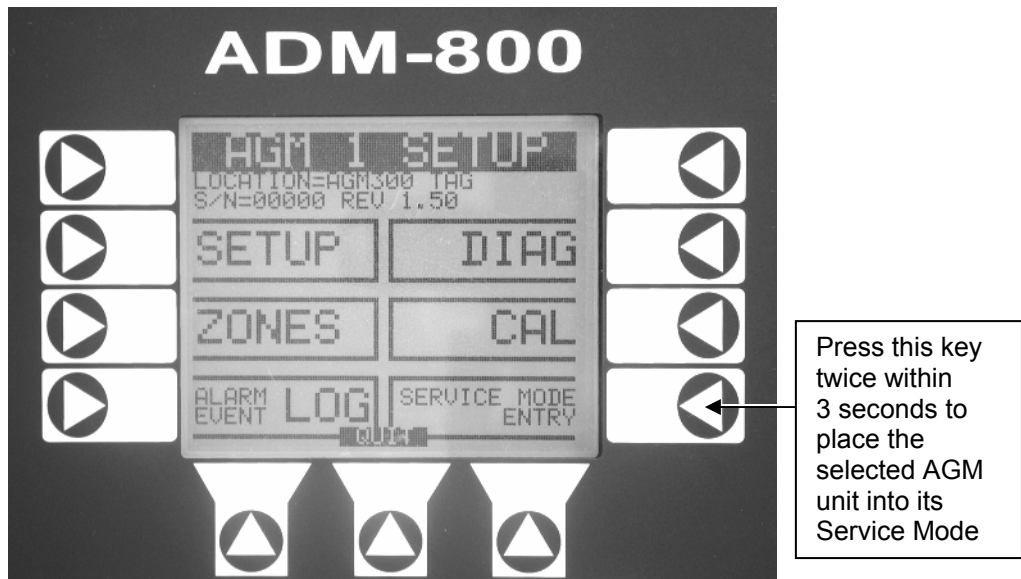
System Screen (Service Mode)

Monitor in Service Mode
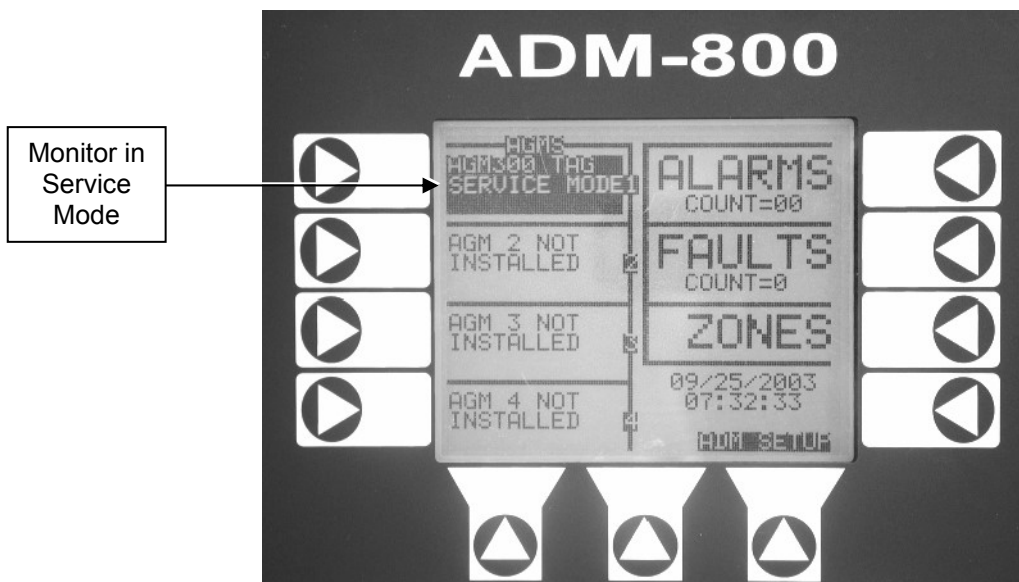
Notes:

Appendix

AGM300 / ADM800 Maintenance

Warnings and Cautions

WARNING - Always remove AC input power to the monitor before working on the interior of the instrument.

CAUTION - When working inside the instrument be very careful not to dislodge any electrical wiring or pneumatic tubing. The AGM300 contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.

Servicing Inline Filter

Locate the inline filter (Page 6) and inspect it for obvious signs of contamination. If the filter is contaminated or has started to turn red in color it should be replaced with P/N 3015-3071.

To replace the filter, remove it from the retaining clip and carefully slide the two pieces of tubing off the fittings. Re-fit the tubing on the new filter, making sure the flow arrow points to the right. Complete the installation by pushing the new filter back into the retaining clip.

Servicing Air Lines

System air lines should be checked periodically for obvious signs of kinks, damage, and contamination. Replace the tubing as required with P/N 304-2742 or equivalent.

The end-line filters should be checked periodically and replaced when there are obvious signs of contamination. To service the filter simply remove it from the air line and replace it with P/N 3015-3420.

Replacing Fuses

Locate the fuse holders (Pages 7 & 23) and remove the fuses from their holders. Visually inspect and test the fuses with an ohm meter for continuity. If necessary, replace any defective fuses.

AGM300, 120 VAC Input, Power Supply P/N 3015-3167

F1: 0.5 A, 250V Fast Acting, 5mm x 20mm, P/N 604-2538
F2: 250 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2537
F3: 5 A, 250V Fast Acting, 5mm x 20mm, P/N 604-2539
F4: 63 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2535

AGM300, 230 VAC Input, Power Supply P/N 3015-3161

F1: 250 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2537
F2: 125 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2536
F3: 5 A, 250V Fast Acting, 5mm x 20mm, P/N 604-2539
F4: 32 mA, 250V Fast Acting, 5mm x 20mm, P/N 604-2534

ADM800

F1 & F2: 1 A, 250VAC, Fast Acting, 5mm x 20mm, P/N 3015-4011

Optional Accessories

Intake Manifolds

Up to three additional intake manifolds (P/N 3015-3419 & P/N 3015-3411) can be installed in the AGM300 to increase the total capacity to 16 zones. Each manifold requires a sample line-end filter for each of the 4 zones.

Please follow the instructions provided to install the manifolds. Then follow the instructions earlier in this manual to install the air lines and complete the zone programming steps. The AGM300 setup must also be updated to recognize the new zones.

4–20 mA Interface Board

The optional 4–20 mA Interface Board (P/N 3015-3133) (Page 7) allows the operator to take advantage of the current loop interfaces provided for connection of external devices to the AGM300. The interface board plugs into the socket provided on the main circuit board, and the external devices are then cabled to the AGM300 as described on Page 16.

ADM800 - Logic Diagram

DIAGNOSTICS

ALARM DETAIL

ALARM SUMMARY

NOTE: Pressing QUIT takes you back to the previous screen.

AGM SETUP #1

SYSTEM

FAULTS

FAULT LOG

ALARM EVENT LOG

ADM SETUP #1

ZONES

CLOCK

AGM SETUP #2

ADM SETUP #2

ZONE SETUP #1

AGM SETUP #3

CALIBRATION

TREND

ZONE SETUP #2
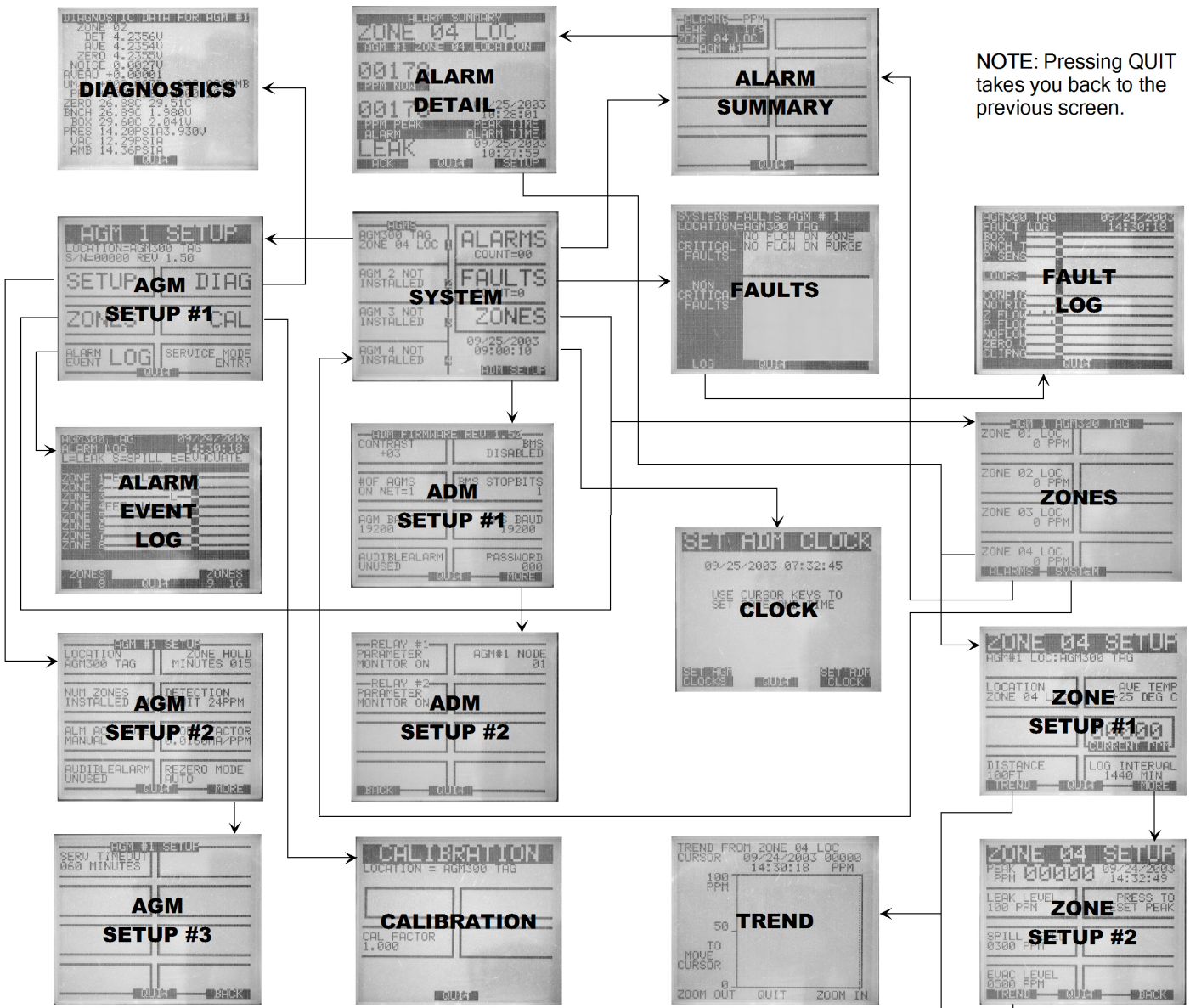
RS-485 Communication Protocol

Overview

The following instructions are intended as a guide for integrating the AGM300 network into a Building Management System. If you are unfamiliar with complex systems of this type, it is recommended that you contact Bacharach for technical assistance.

MODBUS RTU Protocol

The AGM300 monitor communicates with master devices (such as the ADM800 or a Building Management System) over the RS-485 serial interface. The monitor is configured with a two wire RS-485 serial bus, and therefore, data transmission occurs in 'half-duplex' mode. Consequently, only one device may be in transmit mode at any given time.

Programmers should refer to the MODBUS Protocol Reference Guide for details and more comprehensive instructions. The guide is available on the Modicon web site at:
http://www.modicon.com/techpubs/TechPubNew/PI_MBUS_300.pdf

Specific communication software is available at: http://www.bacharach-inc.com/downloads.htm

AGM300 MODBUS RTU Operation

Overview

The AGM300 and ADM800 are equipped to communicate with other equipment using the MODBUS RTU protocol.   Using this communication channel a MODBUS master device may communicate with up to 15 AGM300s on a communications network, exchanging measurement information, alarm data, fault data, history (logs and trends) and setup information. Additionally, the MODBUS master can control the operating state of an AGM300, placing the AGM300 in any of its different operating modes. The network may be configured such that the AGM300s are connected directly to the MODBUS master device, or the MODBUS master device may communicate with the AGM300s through the ADM800.

(**NOTE:** This document will assume that the reader is familiar with the various parameters used to set up the AGM300, as well as the different operational modes that the AGM300 may be placed in. If you are unfamiliar with this information, please reference the AGM300 operations manual.)

Protocol Details

A 2 wire RS-485 bus is used for transmission, therefore communication occurs in a Half-Duplex mode. The AGM300 is a slave device and will respond to queries in the MODBUS RTU format from a master device.

Two MODBUS functions are supported. They are function 03 (read holding register) and function 16 (Preset Multiple registers). Please refer to the MODBUS Protocol Reference Guide (available at www.modicon.com/techpubs/techPubNew/PI_MBUS_300.pdf) for protocol detail and use instructions.

Using the two MODBUS functions, a master device may read, modify and write data and status information to any AGM on the network. AGM data is organized into structures (internal to the AGM300) which can be accessed by the MODBUS registers defined in this document. A corresponding set of data structures should be maintained by the master device. These master device data structures become the destination for responses to read queries and sources for preset register commands. When a read holding register query is made by the master device the AGM300 responds by sending the contents of the structure referenced by the specified register. After the master validates the AGM300 response using the CRC bytes, it must then move the data into its matching data structure before individual items may be accessed or modified. Therefore, the master data structure should correspond to the AGM300 data structure byte for byte.   Note that some data structures have been divided into multiple registers due to MODBUS RTU message length constrains. To change a setting in the AGM300, the master device first reads the register structure that contains the data item to be modified, makes the desired change, then sends the structure back using the preset multiple register function. If the transaction is successful, the AGM300 sends the appropriate MODBUS response. It is the responsibility of the master device when making modifications to insure that all parameters trasfered fall inside the working limits of the AGM300.

Notes on AGM300 Polling

After the AGM300s are setup and operating, the master device need only poll each AGM for its status register which contains summary data of the AGM's alarms, faults, and operating state. If exceptions are detected through the status register and more details are required, additional registers can be examined. Also if current PPM values are required, the PPM register provides access to current PPM values for all zones. The AGM300 requires a minimum of 20 seconds to complete a gas concentration measurement for a single zone. Therefore, it is not necessary to poll the AGM300 more frequently than once every 15-20 seconds, as there will not be any new data available/obtained by more frequent polling. In fact, excessive polling will slow the operation of the AGM300. Under no circumstances should the AGM300 be continuously polled at rate faster than 500mS, as this could result in erroneous readings by the AGM300.

Notes on Network Topologies

AGM300s may be connected directly to the MODBUS network or they may be connected to the network through an ADM800. In either case, each AGM300 must have a unique node ID. Up to 15 AGM300s can be connected directly to the MODBUS network.

If AGM300s are accessed via an ADM800 connected to a MODBUS network, the ADM800 "BMS enabled" parameter must be set equal to "1" via the "ADM SETUP" screen on the ADM800. The same commands and registers are used to communicate with the AGM300 directly or through the ADM800. If the communications is through the ADM800, it monitors each MODBUS message to determine if the message is intended for one of the AGM300s it is connected to. If it is, the ADM800 passes the message through to the AGM300s. If it is not, the message is not passed through. The ADM800 does not make any modifications to MODBUS messages. It simply passes the query through to the AGM300, and passes the response back to the MODBUS master. In other words, it allows the AGM300s to be logically connected to the MODBUS network, when physically they are connected to the local ADM800 network. It is <u>very important</u> to understand that the ADM800 will only pass messages through to the AGM300 when the ADM800 is either in the "SYSTEM" screen or the "ZONE VIEW" screen. If the ADM800 is in <u>any other screen</u>, it will return a MODBUS "busy" exception response (exception code 06).

All ADM800 screens except the SYSTEM and ZONE VIEW screens have a 10 minute timeout interval, after which the screen will return to either the SYSTEM or ZONE VIEW screen, depending on which one it was last in. Also, the ADM800 can be password protected such that a password entry is required in order to view screens other than the SYSTEM or ZONE VIEW screen.

Key Comm Protocol Parameters

MODBUS Mode: RTU only

AGM300 Baud Rate: Default is 19,200. Programmable as defined in System data register

Parity: No Parity

Stop Bits: Default is 1. Can be set for 2 via System data register

Maximum Response Time: 4000mS when directly accessing the AGM300. 8,000mS when accessing the AGM300 through the ADM800.

Error Checking: CRC per MODBUS specifications

Also of note is the fact that all <u>data</u> sent out from the AGM-300 is in "little endian" byte order (Least significant byte followed by most significant byte). This should be taken into account if the master that process the data is a "big endian" type. Non-data information (starting address, number of points, etc.) follows normal MODBUS protocol, which is Big Endian.

Summary of Registers

Register Name	Number	Type	Description
System Data	0x0010h	R/W	AGM System Setup Data
Status	0x0011h	R/W	Operating summary of faults, alarms and status
Zone Data	0x12xxh	R/W	Setup data for up to 16 zones (xx defines zone number)
CAL Data	0x0014h	R/W	Cal Factors for all gases
Date/Time	0x0015h	R/W	Set AGM300 date & time
Sensor Data	0x0016h	R	Raw measurement of sensors
Rel. Hold	0x0017h	W	Release AGM300 out of hold mode
Hold Zone	0x0018h	W	Put AGM300 into hold mode
Fault Log	0x19xxh	R	20 most recent fault events (xx = 00 or 01)
Alarm Log	0x1Axxh	R	20 most recent alarm events (xx = 00, 01, or 02)
Serv. Mode	0x001Bh	W	Puts AGM300 into service mode
Rel Serv.	0x001Ch	W	Release AGM300 from service mode
PPM	0x001Eh	R	PPM values for all zones
Zone Log	0x3yxxh	R	Trend data for each AGM300 zone (y = zone number (starting at 0), xx = 00 – 06)Data

Data Type Abbreviations

C .... Character

Float .... Floating Point

I .... Integer

TIM .... Time

UC .... Unsigned Character

UI .... Unsigned Integer

System Data Register   Register 0x0010h   R/W   54 bytes

Variable	Type	Length	Description
Type	UI	2 bytes	Indicates EEPPROM has been initialized if value = 300 **DO NOT MODIFY**
REV	Float	4 bytes	Firmware Rev Level **DO NOT MODIFY**
SN	UI	2 bytes	Firmware Serial Number **DO NOT MODIFY**
Node	UC	1 byte	Network Slave Node # (valid values are 1-15). The default is that indicated by the Node DIP Switch on main board.
Location	C	13 bytes	Array defining text name of unit
Stop_Bits	C	1 byte	Number of stop bits used in the AGM300 data stream. Default = 1. Other available value is 2
Aud_Alarm	UC	1 byte	Sounds internal board buzzer on condition; 0 = no buzzer; 1= Alarm; 2=Fault; 3=Leak; 4=Spill; 5=Evacuate; 6=Monitor Off line (DEFAULT = 0)
Alarm_Ack_ Mode	UC	1 byte	Defines Alarm Operation. Manual Acknowledge = 0; Auto Acknowledge = 1 (DEFAULT = 0)
Num_Zones	UC	1 byte	Number of install zones (Value initialized during auto detect during Power On Self Test).
UNUSED	TIM	13 bytes	UNUSED
Rezero_Mode	UC	1 byte	Defines rezero mode. Auto Rezero = 0; Rezero every zone = 1 (DEFAULT = 0)
Hold_Time	UI	2 byte	Length of zone hold interval in minutes (DEFAULT = 15 minutes)
Det_Limit	UC	1 byte	Minimum detection limit (in PPM). Concentrations less than or equal this value will read as 0 PPM (DEFUALT = 0 PPM)
Avg_Size	UC	1 byte	Size of running average used in computing PPM value. **DO NOT MODIFY**.
Loop2_factor	Float	4 bytes	Defines PPM current loop output. (DEFAULT = 0.16mA/PPM)
Serv_Mode_TO	UI	2 bytes	Service Mode Timeout value (in minutes). (DEFAULT = 60 MINUTES)
RS-485_BAUD	UI	2 bytes	BAUD RATE for RS-485 connection (between ADM800 and AGM300 or MODBUS master and AGM300 depending on the Network topology). Default=9 (19.2K); other values are 8=9600, 7=4800
UNUSED	UI	2 bytes	UNUSED

Status Register **Register 0x0011h** **R/W** **10 bytes**

Variable	Type	Length	Description
Mode	UC	1 byte	Defines Operating Mode of AGM300. 0 = normal Mode; 1 = Zone_Hold Mode; 2 = Diagnostic Mode; 3 = Service mode. **DO NOT MODIFY (use zone hold register or service mode register to change this parameter)**
State	UC	1 byte	Defines AGM300 Current State. 0 = Idle; 1 = Sampling; 2 = Zeroing; 3 = Warm Up, 4 = Pressure Check **DO NOT MODIFY**
Measuring	UC	1 byte	Value = 1 if unit is acquiring detector signal for running avg. **DO NOT MODIFY**
Active_Zone	UC	1 byte	Current Zone being checked. 0=zone1, 1=zone2, etc.
Max _Alarm	UC	1 byte	Indicates highest non-acknowledged alarm level **DO NOT MODIFY**
Alarm_Count	UC	1 byte	Number of alarms that are currently active **DO NOT MODIFY**
UNUSED	UC	1 byte	UNUSED
Loop_Card	UC	1 byte	Value = 1 if 4-20mA card has been detected **DO NOT MODIFY**
Fault	UI	2 bytes	See Note Below

Fault Flag Structure uses bitwise access to 16 bit word as defined below:

Bit 15	(MSB)	Clipping Fault	A/D out of range
Bit 14		Zero Fault	Zero voltage outside factory limits
Bit 13		No Flow	No flow on any zone
Bit 12		Purge Flow	No flow on purge
Bit 11		Zone Flow	No flow on a particular zone(s)
Bit 10		Trigger Fault	IR Source clock trigger missing
Bit 9		Unused	
Bit 8		Unused	
Bit 7		Config. Fault	No Zones Enabled
Bit 6		Unused	
Bit 5		Unused	
Bit 4		Loop Fault	Open Current loop
Bit 3		RS-485 Fault	Comm Error
Bit 2		Pressure Fault	Pressure out of normal operating range
Bit 1		Bench Temp Fault	Bench temperature out of normal operating range
Bit 0	(LSB)	Box Temp Fault	Box temperature fault

Zone Data   Register 0x12xxh   R/W   78 bytes

Each zone for an AGM300 has a separate Zone data structure that is 78 bytes long. The zone number is the low order byte in the register address (i.e., Zone 1 data register = 0x1201h)

Variable	Type	Length	Description
Location	C	13 bytes	13 byte array, Alpha Numeric Description or Name of Zone
Flow OK	UC	1 byte	Status of Flow check. Value of 1 indicates flow check is good. **DO NOT MODIFY**
Refrig. Type	UC	1 byte	See note 1 Below (DEFAULT = R134a)
Distance	UI	2 bytes	Zone Tubing Length (in feet) (DEFAULT = 100 feet)
Zone Temp	I	2 bytes	Avg temp at zone (degrees C) (DEFAULT = 25°C)
Concentration	Float	4 bytes	Last Measured concentrations (uM/L) **DO NOT MODIFY**
Concentration2	Float	4 bytes	Last Measured concentration (PPM) **DO NOT MODIFY**
Alarm Ack	UC	1 bytes	Set value to 1 to acknowledge Alarm. **NOTE:** AGM300 will reset this byte to 0 when the Alarm byte (below) is = 0 and zone in alarm is sampled. If the alarm condition/byte increases (leak>>spill or spill>>evac) the AGM300 will also reset this byte to 0
Alarm	UC	1 bytes	Alarm Status; 0 = no alarm, 1 = leak; 2 = spill; 3 = evac.
Leak Level	UI	2 bytes	Level to trigger a leak alarm (in PPM) (DEFAULT = 100)
Spill Level	UI	2 bytes	Level to trigger a spill alarm (in PPM) (DEFAULT = 300)
Evac Level	UI	2 bytes	Level to trigger a evacuate alarm (in PPM) (DEFAULT = 500)
Peak PPM	UI	2 bytes	Highest Recorded PPM in zone
Peak Time	TIM	13 bytes	Date an time of highest peak (see note 2 for format)
Alarm Time	TIM	13 bytes	Date and time of last alarm (see note 2 for format)
Not Used		13 bytes	
Log Interval	UI	2 bytes	Number of minutes between Log entries (DEFAULT = 1440)

NOTE 1: Refrigerant Types Defined from 00h to 20h in the following order : 00h=R11, 01h=R12, 02h=R22, 03h=R23, 04h=R113, 05h=R114, 06h=R123, 07h=R124, 08h=R134a, 09h=R401a, 0Ah=R402a, 0Bh=R402b, 0Ch=R404a, 0Dh=R407a, 0Eh=R407c, 0Fh=R409a, 10h=R410a, 11h=R500, 12h=R502, 13h=R503, 14h=R507, 15h=R508b, 16h=H1301, 17h=R408a, 18h=Future2, 19h=Future3, 1Ah=Future4, 1Bh=Future5, 1Ch=Future6, 1Dh=Future7, 1Eh=New1, 1Fh=New2, 20h=New3

NOTE 2: Time Structure Format consists of 13 unsigned character types. They are 1 second digit, 10 second digit, 1 minute digit, 10 minute digit, 1 hour digit, 10 hour digit, 1 day digit, 10 day digit, 1 month digit, 10 month digit, 1 year digit, 10 year digit, last byte is unused.

Notes on Alarms and Alarm Acknowledge

The AGM300 can be operated in two different alarm acknowledge modes, Auto and Manual (set via the alarm_ack_mode variable in the system data register). For purposes of this discussion, the term "Alarm" refers to an AGM300 state where the alarm light is on and the appropriate alarm relay is activated. The term "Alarm condition" refers to the external condition (i.e., refrigerant leak) that initially causes the AGM300 to go into an alarm. If an alarm occurs it can be handled in one of 3 ways.

1. Non-Latching Mode. This mode is enabled by setting the AUTO_ACK_MODE parameter in the system register to "1". In this mode, if an alarm condition occurs an AGM300 alarm will be created. If the alarm condition is subsequently removed, the AGM300 alarm will automatically be cleared by the AGM300 when the zone in alarm is sampled "clear". Note, in this mode of operation, it is possible for an alarm to occur and be cleared without user or MODBUS master intervention. If this is the case, the only evidence of the alarm would be contained in the AGM300 alarm log.

2. Latching Mode with Silence. This mode is enabled by setting the AUTO_ACK_MODE in the system register to "0". In this mode, if an alarm condition occurs, an AGM300 alarm will be created. In order for the alarm to be removed the MODBUS master will write a "0" to the ALARM parameter in the ZONE register. This will cause the alarm to be "silenced" in the AGM300 (i.e., the alarm relays will return to their normal state and the ALARM lamp will be extinguished). The next time the zone with the alarm condition is sampled, if the alarm condition still exists, the alarm will be reactivated and the alarm parameter will be reset to "1" in the AGM300. Otherwise, if the alarm condition has cleared, no further action is required and normal operation will resume.

3. Latching Mode without Silence. This mode is enabled by setting the AUTO_ACK_MODE in the system register to "0". In this mode, if an alarm condition occurs, an AGM300 alarm will be created. The AGM300 MODBUS master will then write a "1" to the ALARM ACK parameter in the zone register. The alarm will continue to persists (i.e., Relays in alarm state and Alarm light on) until the offending zone is sampled and no alarm condition is detected. At that point, the ALARM ACK parameter is automatically cleared by the AGM300, as is the ALARM parameter. **NOTE:** If the ALARM ACK parameter is set to "1" and the ALARM CONDITION is upgraded (from leak to spill, or spill to evacuate) the ALARM ACK parameter will automatically be cleared to "0" by the AGM300.

Cal Data Register   **Register 0x0014h**   **R/W**   **174 bytes**

Variable	Type	Length	Description
Factor	Float	132 bytes	33 element array containing cal factors for each of the 33 gases. Order of Cal Factor is defined in Note 1 under Zone Data
Curve	UC	3 bytes	Existing Master Curve to use for user defined "NEW GAS"
New Gas Name	C	39 bytes	3 x 13 array that contains the names for each of 3 new gases

NOTE: "Future" Gases are gases that will be added to the library at a later date. They will require generation of new cal curves that will be added to the code. "New" Gases can be added in the field by selecting a similar existing cal curve and then defining a cal factor that will bring the accuracy within the desired range. It is strongly recommended that any New Gas curves that are added be done in conjunction with help from Bacharach, Inc.

Date Time Register   **Register 0x0015h**   **R/W**   **14 bytes**

Variable	Type	Length	Description
Date_Time	Time	14 bytes	Contains current time and date. Structure is defined as in note 2 of zone data

Time Structure Format consists of 14 unsigned character types. They are 1 second digit, 10 second digit, 1 minute digit, 10 minute digit, 1 hour digit, 10 hour digit, a day digit, 10 day digit, 1 month digit, 10 month digit, 1 year digit, 10 year digit, day of the week, last byte is unused.

Sensor Data Register   **Register 0x0016h   R   82 bytes**

Variable	Type	Length	Description
Pressure	Float	4	Manifold Pressure is PSIA
P_Volts	Float	4	Pressure sensor output Voltage
Vacuum_P	Float	4	Pressure with all value closed and pump on in PSIA
Ambient_P	Float	4	Absolute Ambient Pressure in PSIA
Box_T	Float	4	Enclosure Temperature in Degrees C
Box_T_Volts	Float	4	Box temp sensor output voltage
Bench_T	Float	4	Optical bench temperature in Degrees C
Bench_T_Volts	Float	4	Bench temp sensor output voltage
Bench_Z_T	Float	4	Optical bench temp in degrees C at last zero interval
Box_Z_T	Float	4	Box temp in degrees C at last zeroing
PkPk_int	UI	2	Current peak to peak A/D counts from detector
PkPk	Float	4	Current peak to peak voltage from detector
Ave_PkPk	Float	4	Running average voltage from detector
Zero_PkPk	Float	4	Voltage measured at last zeroing
Noise	Float	4	Largest Change in running average
AU	Float	4	Current absorbance value
Ave_AU	Float	4	Running Average of absorbance level
Bench_PPM	Float	4	PPM in bench based on zone gas selection (uncorrected for pressure and temperature)
STP_PPM	Float	4	PPM corrected to STP (1 atm, 25 deg C)
Bench_UML	Float	4	Micromoles/liter in bench (uncorrected0
Ambient_UML	Float	4	Micromoles/liter corrected to ambient pressure

Release Zone Hold Register   **Register 0x0017h**   **W**   **10 bytes**

Variable	Type	Length	Description
Rel_Hold	*	*	**See description of STATUS REGISTER**

Hold Zone Register   **Register 0x0018h**   **W**   **10 bytes**

Variable	Type	Length	Description
Zone_Hold	*	*	**See description of STATUS REGISTER**

Notes Concerning the AGM300 Hold Mode

The AGM300 can be made to hold or "dwell" on a particular zone if necessary. The length of the hold time is defined by the HOLD TIME parameter in the System Data Register. In order to place the AGM300 into hold mode use the following sequence:

- Read the AGM300 Status Register (0x0011h)

- Modify the content of the status register structure to change the MODE parameter to zone hold mode and the active zone parameter to the zone which you wish to hold

- Send this updated status register structure back to the AGM300 using PRESET MULTIPLE REGISTER COMMAND to the HOLD ZONE REGISTER (0x0018h).

To Release the Zone Hold Use the Following Sequence of Steps

- Read the AGM300 Status Register (0x0011h)

- Modify the content of the status register to change the MODE parameter to normal mode and the active zone parameter to the zone which you would like to resume normal activity on

- Send this updated status register structure back to the AGM300 using PRESET MULTIPLE REGISTER COMMAND to the RELEASE HOLD REGISTER (0x0017h).

Fault Log Register   **Register 0x1900, 0x1901h   R   302 bytes**

These registers contain the 20 most recent fault events, the time they occurred, and a pointer to the most recent event. The data is split into 2 registers. The first register contains 200 bytes and the second register contains 102 bytes. The results of these two register reads should be recombined into the Fault Log Data Structure after both have been received

Variable	Type	Length	Description
Fault	UI	40 bytes	20 most recent fault events. Each event is decoded as indicated in Fault Flag Structure given after the Status Register Description
Time	TIM	260 bytes	Time of each fault occurrence. TIM value as defined in NOTE 2 of Zone Data
Ptr	UC	1 byte	Pointer to most recent event
Unused	UC	1 byte	

Alarm Log Register   **Register 0x1A00h, 0x1A01h, 0x1A02h R   582 bytes**

These registers contain the 20 most recent alarm events, the time they occurred, and a pointer to the most recent event.   The data is split into 3 registers and should be recombined into an appropriate structure after all three registers have been received. Register 0x1A00h contain 200 bytes, Register 0x1A01h contains 200 bytes, and register 0x1A02h contains 181 bytes.

Variable	Type	Length	Description
Event	UC	320 bytes	20 most recent alarm events. Each event contains 1 byte for each zone. Each zone Byte is defined as 0=No Alarm, 1=Leak Alarm, 2=Spill Alarm, 3=Evac Alarm.
Time	TIM	260 bytes	Time of each alarm event. TIM value as defined in NOTE 2 of Zone Data
Ptr	UC	1 byte	Pointer to most recent event
Unused	UC	1 byte	

Service Mode Register   **Register 0x001Bh**   **W**   **10 bytes**

Variable	Type	Length	Description
Rel_Svc_Mode	*	*	**See description of STATUS REGISTER**

Release Service Mode Register   **Register 0x001Ch**   **W**   **10 bytes**

Variable	Type	Length	Description
Ent Svc_Mode	*	*	**See description of STATUS REGISTER**

Notes Concerning the AGM300 Service Mode

The AGM300 can be placed into service mode if necessary. During service mode the unit will take no measurements, any and all alarms are silenced, and all relays are opened.   The unit automatically comes out of service mode after a preset interval defined by the service_mode_TO parameter in the System Data Register. In order to place the AGM300 into service mode use the following sequence:

- Read the AGM300 Status Register (0x0011h)

- Modify the content of the status register structure to change the MODE parameter to service mode.

- Send this updated status register structure back to the AGM300 using PRESET MULTIPLE REGISTER COMMAND to the SERVICE MODE REGISTER (0x001Bh).

To Release the Unit from Service Mode Use the Following Sequence of Steps

- Read the AGM300 Status Register (0x0011h)

- Modify the content of the status register to change the MODE parameter to normal mode.

- Send this updated status register structure back to the AGM300 using PRESET MULTIPLE REGISTER COMMAND to the RELEASE SERVICE MODE REGISTER (0x001Ch).

PPM Register   **Register 0x001Eh**   **R**   **32 bytes**

Variable	Type	Length	Description
PPM	UI	32 bytes	16 Unsigned Integers that represent the PPM values for each AGM300 zone

NOTE: 16 values are returned independent of the number of actual zones installed in the unit. The master device is required to know how many zones are installed in the unit (available in the System Register) in order to properly interpret the data.

Zone Log Registers   **Register 0x3xyyh**   **R**   **1502 bytes**

These registers are used to transfer the zone log data. Each zone has a circular log of 100 past data points. The period between data points is defined by the Log Interval parameter in each corresponding Zone Data Register. The data for each zone is defined by the "x" place in the above register address. For zone 1 the Register address is 0x30yyh, for zone 2 the register address is 0x31yyh, etc. The data for each zone is sent in 8 consecutive registers due to MODBUS RTU message length constrains. The addresses are defined by the "yy" place in the above address. For zone 1, all log data can be obtained by reading 0x3000h, 0x3001h, 0x3002h, …… , 0x3007h. The first seven registers contain 200 bytes each and the last register contains 102 bytes. After all registers have been received the data should be reassembled into the full data structure.

Variable	Type	Length	Description
Index	UI	2	**Point to current reading**
Time	TIM	1300	**Time record for each of the 100 log points. The format for the TIM type is defined in note 2 of zone data**
PPM	UI	200	**Last 100 log points (2 byes per point)**

MODBUS EXCEPTION RESPONSES

The following MODBUS exception response are supported by the AGM300:

01   Illegal Function

02   Illegal Data Address

06   Slave Device Busy (Occurs only when AGM300 is connected to the bus through an ADM800 and the ADM800 is not in the SYSTEM or ZONE VIEW screen)

WARRANTY and SERVICE

Warranty

Subject to the terms herein, Seller warrants the original equipment cataloged or manufactured by the Seller and furnished hereunder is free from defects in material and workmanship, and will be of the kind and quality designated or described on the quotation. The Seller will warrant the original equipment for 24 months from the date of shipment from the manufacturing facility unless different or additional conditions are specified and shall be binding through a written contract signed by an officer of the Seller.

Seller also warrants that certain consumable parts as hereunder identified have a one (1) year warranty period from the date of shipment and will be free from all defects in material during that period. Seller does not warrant these parts however, beyond the initial installation due to variables associated with normal usage. These certain consumable parts include, but are not limited to, the air flow filters.

If within 24 months of the date of shipment, the equipment does not meet the warranties specified above, and Purchaser notified Seller of this promptly, Seller shall there upon correct any such defects or any non-conformance to the specifications within a reasonable time period. Material found to be defective shall be returned to the seller freight prepaid. At the Seller's option, the defective material shall be repaired or replaced and returned to the purchaser via the lowest freight rate available. **Any repairs or alternations made by unauthorized personnel will automatically void warranty.**

Labor cost for warranty service at the manufacturing facility is the Seller's responsibility for a period of 90 days following date of shipment. Beyond 90 days, Purchaser is responsible for all labor costs. Purchaser must contact the Seller's Service Department prior to shipment and obtain a Return Authorization (RA) number. The package must be clearly marked with the assigned RA number. Purchaser may elect to have Seller's Service Department repair the equipment at Purchaser's facility. Purchaser must contact Seller's Service Department to arrange for a Service call. Parts will be free under the above terms, but there will be a charge for labor and travel expenses from Seller's facility in New Kensington, PA..

The conditions of any tests or equipment hereunder alleged to be defective shall be mutually agreed upon and Seller shall be notified of, and may be present or represented at all tests that may be made. Seller's liability to Purchaser or that of Seller's Agent/Representative, arising out of the supplying of the equipment or its use, whether based on warranty, contract, or negligence shall not in any case, exceed the cost of correcting defects in the equipment as herein provided but shall, in all events, be limited to a maximum of the purchase price. Upon the expiration of the applicable warranty period mentioned above, all such liability shall terminate. The foregoing shall constitute Purchaser's sole remedy and Seller's sole liability. **IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

Register Your Warranty by Visiting
www.bacharach-inc.com

Service

Pursuant to the stated warranty, Bacharach, Inc. warrants the products to be free of manufacturers defect for two (2) years from the date of shipment or installation and will replace any part free of charge during that period. Labor beyond ninety (90) days of shipment or installation is subject to charge. **FAILURE TO LOCATE THE AGM300 OR ADM800 IN A LOCATION COMPATIBLE WITH THE CRITERIA SET FORTH IN THIS MANUAL CONSTITUTE ABUSE OF THE EQUIPMENT AND MAY VOID THE WARRANTY.** Shipments are tracked by the factory and the purchaser will be responsible for providing acceptable documentation to prove the installation date. **FAILURE TO NOTIFY THE FACTORY WITHIN TWO (2) WEEKS OF INSTALLATION OF THE EQUIPMENT WILL VOID THE COVERAGE OF THE LABOR SPECIFIED IN THE WARRANTY.** Should any of the products covered (refer to following section - Products Covered under Warranty and Service Policy) incur a failure or damage contact the factory service department (724-334-5051) and request instructions.

Return Procedure

To return equipment to the factory for repair a Return Authorization (RA) number should be requested from the factory. Equipment will not be received without an RA number. Returned equipment should be sent to the factory at the following address:

Bacharach, Inc.

621 Hunt Valley Circle

New Kensington, PA 15068

Attn.: Service Department

Field Repair

Field repair of equipment will be considered after all reasonable attempts to diagnose and rectify the problem via phone or fax have been exhausted or if return of the equipment to the factory is not practical. To initiate warranty service in the field, a customer purchase order must be issued, prior to dispatch, for the estimated travel time, expenses and applicable service fees for a Bacharach representative to travel to the site. Bacharach will bill expenses to the customer at actual cost. The customer will be invoiced for all applicable charges for parts, labor and expense at the Non-Warranty rates if it has been determined that the failure is a result of abuse of the equipment, improper installation, or failure to thoroughly read and comply with the instructions provided in the Operations and /or Service Manuals. Scheduling of all field servicing is at the discretion of the Factory Service Department and will be based upon customer need and the availability of personnel. Warranty field service shall be limited to the continental United States.

Bacharach, Inc. is not liable for any charges, from the customer, purchaser or any third party that may be acting on the behalf of the purchaser, customer or end user, resulting from non-warranty field service, field upgrades, preventative maintenance, etc. Bacharach, Inc. is not liable for any charges, from the customer, purchaser or any third party that may be acting on the behalf of the purchaser, customer or end user, resulting from warranty field service or repair activities unless prior approval is granted by an authorized member of Bacharach, Inc. prior the dispatch and performance of the field service or repair activity. This is to include but not limited to: manpower requirements for Bacharach and/or non-Bacharach personnel to perform or assist with the field service or repair activity.

Products Covered under Warranty and Service Policy

The following items are covered under the stated warranty for Parts and Labor:

Model	Description
AGM300	Ammonia Gas Monitor
ADM800	Ammonia Display Module

AGM300 - Specifications

Product Type:	Ammonia gas, multiple area infrared monitoring system for low level continuous monitoring of ammonia refrigerant gas used in most commercial refrigeration systems. System design supports compliance to the refrigerant monitoring requirements of ANS/BSR ASHRE 15-1994.
Coverage:	4-point standard, expandable to 16 points in 4 point increments
Detector Type:	Infrared non-dispersive, computer enhanced
Gas:	Ammonia, NH_3, R-717
Sensitivity:	1 ppm
Measuring Range:	25 to 10,000 ppm
Accuracy:	±10 % of reading
Front Panel:	3 Indicator lights:

- One green light will glow steady when unit is operating normally, or flashing when unit is in warm-up mode
- One red light will glow steady when any point is above the alarm setting, or will be flashing when the unit is in service mode
- One yellow light will glow when there is a system fault

Temperature Drift:	±0.3% of reading per degrees C
Sampling Mode:	Automatic or manual (hold)
Re-Zero:	Auto or on zone change
Response Time:	5 to 120 seconds - depending on air line length and number of zones
System Noise:	Less than 40dB(A) @ 10 feet
Monitoring Distance:	Up to 500 feet maximum air line length (each zone)
Conditioned Signal:	Dual optional 4–20 mA isolated outputs; Channel 1 = zone area; Channel 2 = PPM
Alarms:	Four SPDT alarm contacts are provided (Rated 5 amp 120 VAC)
	Three assigned to PPM level alarms - One assigned to system faults
Communications:	• Full two-way communication with ADM800 Ammonia Display Module or Building Management System via RS-485 serial interface.
	• RS-232C communication port standard
	• MODBUS RTU communication protocol standard
Power Safety Mode:	Fully automatic system reset. All programmed parameters retained.
Operating Temp:	32 to 113 °F (0 to 45 °C)
Ambient Humidity:	5 to 90% (non-condensing)
Size/Weight:	17"H x 12"W x 5.5"D - 15 lbs.
AC Power:	120 or 230 VAC, 50/60 Hz, 21 Watts
Certification:	UL #61010-1 and CE Mark
Warranty:	Two (2) Years from date of shipment
Altitude Limit:	2,000 Meters

ADM800 - Specifications

Product Description: The ADM800 Ammonia Display Module provides remote programming, interrogation and display functionality to support the AGM300 Ammonia Gas Monitor. The system design supports compliance to the refrigerant monitoring requirements of ANS/BSR ASHRE 15-1994.

Inputs: The ADM800 accepts inputs from up to four AGM300 monitors. It offers a wide variety of displays and can fully program any associated monitor.

Display: Back lit LCD

Power Indication: Green LED glows when AC power is applied

Alarm Indication: Red LED glows and alarm condition is displayed

Fault Indication: Yellow LED glows and fault condition is displayed

Password Protection: The ADM800 can be password protected to prevent the unauthorized editing of setup parameters without disturbing the ability to monitor system outputs

Power Safety Mode: Fully automatic system reset; all parameters maintained

Monitoring Distance: Up to 4500 feet from furthest AGM300

Communications: Full two-way communication with AGM300 monitors via RS-485 interface. A second RS-485 interface provided for connection to a Building Management System.

Relays: Two SDDT programmable alarm contacts are provided (Rated 5 amp 120 VAC)

Operating Temp: 32 to 113 °F (0 to 45 °C)

Ambient Humidity: 5 to 90% (non-condensing)

Size/Weight: 11"H x 10"W x 3"D - 5 lbs.

AC Power: 120 to 230 VAC, 50/60 Hz, 21 Watts

Mounting: Wall mount

Certification: UL 61010-1 and CE Mark

Warranty: Two (2) Years from date of shipment

Altitude Limit: 2,000 Meters

Notes:

BACHARACH

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621 Hunt Valley Circle, New Kensington, PA 15068
Ph: 724-334-5000 • Fax: 724-334-5001 • Toll Free: 1-800-736-4666
Website: www.bacharach-inc.com • E-mail: help@bacharach-inc.com

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